ARCADIS

Infrastructure, environment, facilities

LDEQ RECEIPT

2007 JUL 13 AM 9 20

ARCADIS U.S., Inc.
10352 Plaza Americana Drive
Baton Rouge
Louisiana 70816
Tel 225.292.1004
Fax 225.218.9677
www.arcadis-us.com

ENVIRONMENT

Mr. Bijan Sharafkhani, P.E.
Administrator
Waste Permits Division
Office of Environmental Services
Louisiana Department of Environmental Quality
P. O. Box 4313
Baton Rouge, Louisiana 70821-4313

RECEIVED

JUL 13 2007

Subject:
Submittal of Final Copies of Permit Renewal Application
Storm Water Oil/Water Separator Treatment System
Chevron Oronite Company, LLC, Belle Chasse, Louisiana
Agency Interest No. 1708/PER20050009
GD-075-1511/Permit No. P-0112-A-1

Date:
13 July 2007

Contact:
John Ellis

Extension:
208

Email:
john.ellis@arcadis-us.com

Our ref:
LA002582.0002.00001
Chevron/2582.2/C/3/egp

Dear Mr. Sharafkhani:

On behalf of our client, Chevron Oronite Company, LLC (Chevron), ARCADIS is submitting six copies of the complete permit application for the above referenced facility. These copies were requested by the Louisiana Department of Environmental Quality - Waste Permits Division in a letter dated June 21, 2007.

Should you have any questions or require any additional information, please contact Mr. John Ellis at (225) 292-1004 or Mr. Troy Sampey of Chevron at (504) 391-6314.

Sincerely,

ARCADIS U.S., Inc.

John Ellis, P.G.
Senior Scientist/Geologist

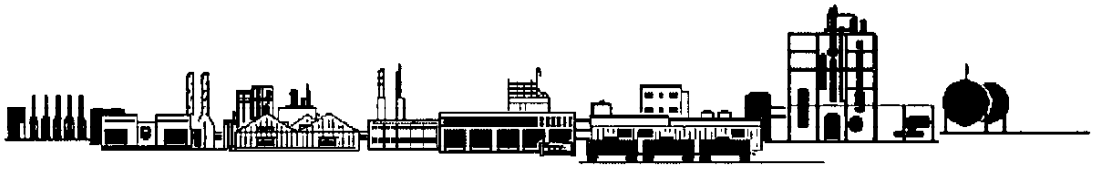
Rudy J. Guichard
Senior Vice President/Area Manager

JE:RJG:egp

Attachments

Chevron

Oronite



RECEIVED
JUL 13 2007

SOLID WASTE PERMIT RENEWAL APPLICATION FOR STORM WATER TREATMENT SYSTEM

CHEVRON ORONITE COMPANY, LLC
OAK POINT PLANT
BELLE CHASSE, LOUISIANA
AGENCY INTEREST NO. 1708
PER20050009
GD-075-1511
P-0112-A-1
13 July 2007

VOLUME II OF II

ARCADIS
Infrastructure, environment, facilities

SOLID WASTE PERMIT RENEWAL APPLICATION FOR STORM WATER TREATMENT SYSTEM

TABLE OF CONTENTS

VOLUME II

Appendix J

24-Hour/25-Year Rainfall Map

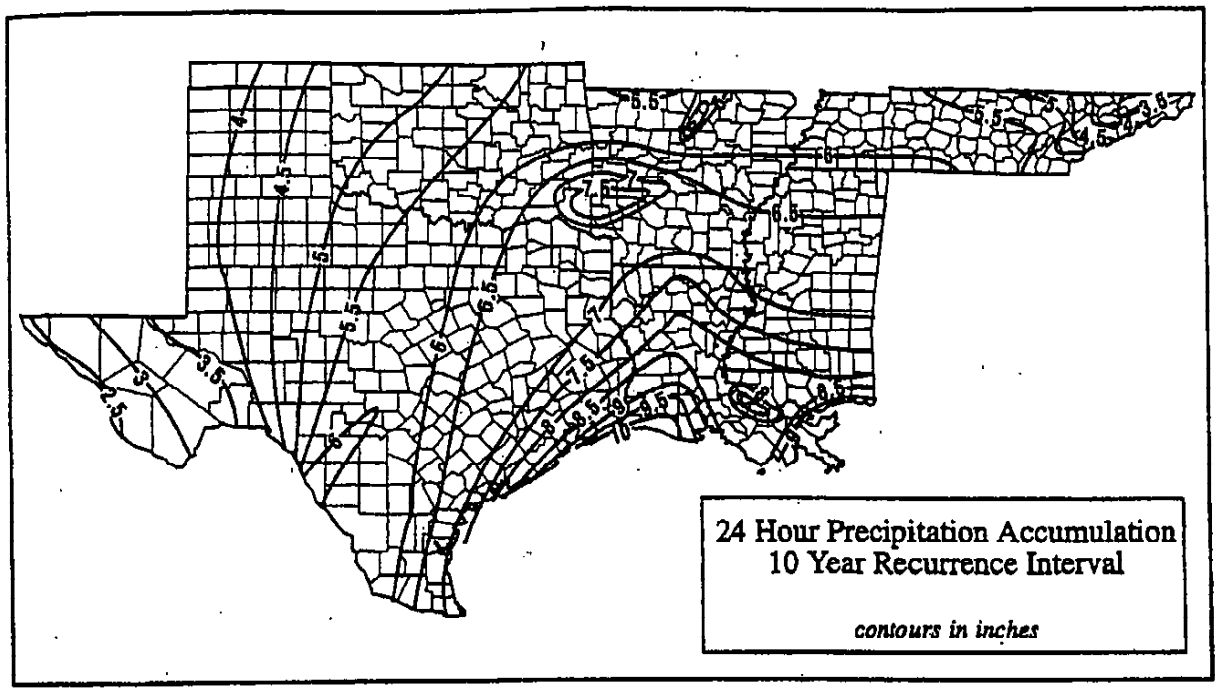


Fig. 6.3. 24-hour 10-year rainfall pattern.

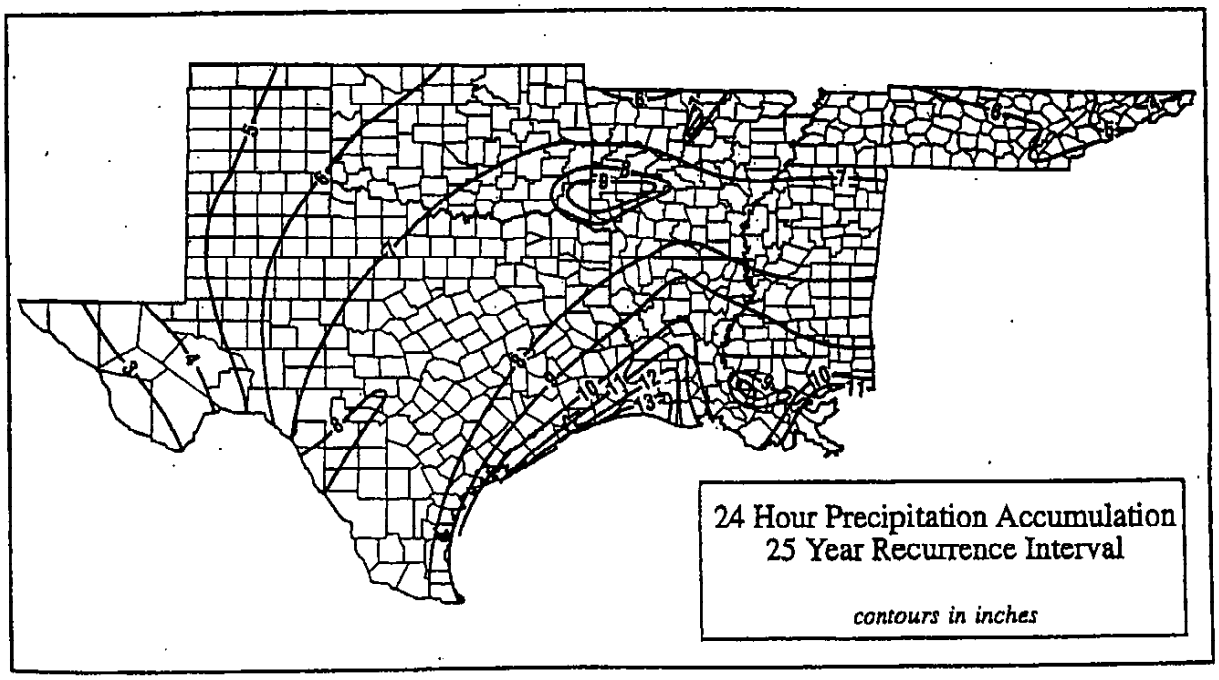


Fig. 6.4. 24-hour 25-year rainfall pattern.

Appendix K

Geologic Summary of Aquifers in
New Orleans, Louisiana

GEOLOGIC SUMMARY OF AQUIFERS IN GREATER NEW ORLEANS AREA

System	Series	Aquifer		Thickness (feet)	Description and Remarks (depth below land surface of top of aquifer, in feet)	Aquifer Characteristics	Water Quality
Quarternary	Holocene	Shallow Aquifers	Point Bars	Variable; maximum 150	Fine to very fine sand and silt. Bars accumulate on inside of river bends. (10-60)	Poor prospect for development because of low hydraulic conductivity.	Generally very hard with high iron concentrations.
	Pleistocene		Distributary Channel Deposits	Maximum 100	Fine sand. May contain organic debris. (5-10)	No aquifer test results.	Generally very hard with high iron concentrations.
			Isolated near-surface sands	Variable; maximum 180	Variable lithology. Sands occur locally and pinch out in short distances.	No aquifer test results.	Variable depending on location. Generally contain salty, very hard water.
		Gramercy		0-150	Fine to coarse sand. Discontinuous with variable thickness; pinches out in eastern Orleans Parish. Hydraulically connected with the Mississippi River. (125-225)	Hydraulic conductivity 30-60 ft/day.	Generally salty water except in northwest corner of Jefferson Parish.
		Norco		0-275	Fine to medium sand. Variable thickness; pinches out in eastern Orleans Parish. (300-400)	Hydraulic conductivity 50-210 ft/day.	Generally salty water except for northwest corner of Jefferson Parish where fresh water has low hardness with pH between 7.5 and 8.0.
		Gonzales-New Orleans		150-300	Mostly fine to medium sand of uniform texture. Continuous throughout the area; pinches out to the east beneath coastal waters. (400-800)	Hydraulic conductivity 80-120 ft/day based on tests in Jefferson and Orleans Parishes.	Fresh water is soft and low in iron and manganese concentrations; pH averages about 8.0.
		"1,200-foot" Sand		50-130	Fine to medium sand. Pinches out to the east beneath coastal waters. (800-1,200)	Hydraulic conductivity estimated 10-40 ft/day based on measurements of specific capacity.	Contains salty water except in northeast corner of Orleans Parish.

Reference: "Groundwater Data for the Mississippi River Parishes in the Greater New Orleans Area, Louisiana, United States Geological Survey Water Resources, Basic Records No. 11, 1983.

Chev9/14

Appendix L

Lithologic Logs, Well Construction Diagrams, and Geotechnical Investigation Results

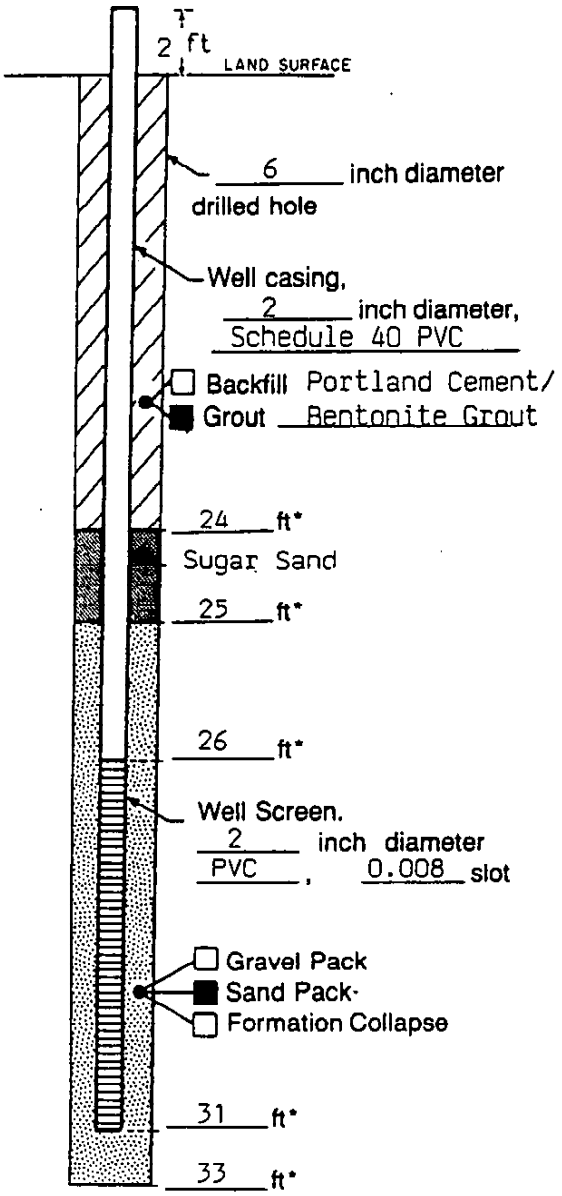
Geraghty & Miller, Inc.

LITHOLOGIC LOG OF MONITOR WELL MW-13

Description	Depth (ft)	Thickness (ft)
Fill material - shell.....	0 - 1.5	1.5
Clay, sandy, soft to firm, gray; shell fragments.....	1.5 - 3	1.5
Clay, silty, soft, gray to greenish gray; organics.....	3 - 7.5	4.5
Clay, silty, very soft, gray; organics....	7.5 - 12	4.5
Clay, silty, very soft, gray; organics; trace of sand.....	12 - 13.5	1.5
Clay, sandy, soft, gray.....	13.5 - 15	1.5
Clay, silty, very soft, gray.....	15 - 16.5	1.5
Clay, silty, very soft, gray; sand lenses.	16.5 - 18	1.5
Clay, silty, very soft, gray; shell fragments.....	18 - 22.5	4.5
Clay, silty, very soft, gray; sand lenses; shell fragments.....	22.5 - 25.5	3
Silt, sandy, very soft, gray.....	25.5 - 27	1.5
Sand, silty, loose to firm, gray.....	27 - 31	4
Sand, clayey, loose, gray.....	31 - 33	2
Clay, sandy, soft, gray.....	33 - 34.5	1.5

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron - 1495BC1 Well MW-13
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) November 1981
Drilling Method Mud Rotary
Drilling Contractor Eustis Engineering
Drilling Fluid Mud

Development Technique(s) and Date(s)
NA

Fluid Loss During Drilling NA gallc
Water Removed During Development NA gallc
Static Depth to Water NA feet below M
Pumping Depth to Water NA feet below M
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose
Initially LDNR Hazardous waste compliance monitor well

Remarks

Prepared by Kipper W. Montgomery

CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
SOLID WASTE GROUNDWATER MONITORING DATA

1) **A copy of your ground water monitoring plan as proposed to or approved by Department of Environmental Quality. This is to include all appropriate hydrogeological data, historic and current potentiometric evaluations, scaled site maps displaying all monitoring wells and piezometers. Also include details of water level measurements, well purging, sampling, preservation, chain of custody and analyzes (only reference test methods).**

The LDEQ approved our solid waste groundwater monitoring program. Our facility received a Solid Waste Permit (Permit No. P-0112-A1) on July 28, 1986. The following attachments contain the requested data:

Attachment #1: Hydrogeological data.
Attachment #2: Potentiometric data and location of monitor wells.
Attachment #3: Site maps.
Attachment #4: Sampling and analysis plan.

The approved groundwater monitoring network consists of one upgradient well and two downgradient wells for each facility as per section 7.3.3 of the Louisiana Solid Waste Rules and Regulations:

- Stormwater Oil/Water Separator- The upgradient well, MW-14, and the downgradient wells, MW-13 and MW-50 comprise monitoring for the separator. These wells are completed in the "30-foot aquifer". This is considered the uppermost aquifer and has been identified as a continuous layer of silty sand and underlying the facility at a depth of approximately 30 feet.

- Associated ditches- The upgradient well, MW-14, and the downgradient wells, MW-13 and MW-50 also comprise the monitoring for the ditches. These wells are completed in the "30-foot aquifer".

- Stormwater Impoundment Basin- The upgradient well, MW-15, and the downgradient wells, MW-16 and MW-17 comprise monitoring for the basin. These wells are also completed in the "30-foot aquifer".

Construction details of monitor wells MW-14, MW-13, M-50, MW-15, MW-16 and MW-17 are as follows:

Well	Top of Casing Elevation/Land Surface Elevation (feet, MSL)	Total Depth of Boring (Feet, below land surface)	Screen interval (Feet, below land surface)	PVC Well Diameter (inches)
MW-14	8.93/6.93	36	29-34	2
MW-13	7.78/5.78	34.5	26-31	2
MW-50	5.91/3.91	37	29-34	2
MW-15	11.73/9.73	49.5	13-18	2
MW-16	10.47/8.47	49.5	20-25	2
MW-17	10.91/8.91	35.5	27-32	2

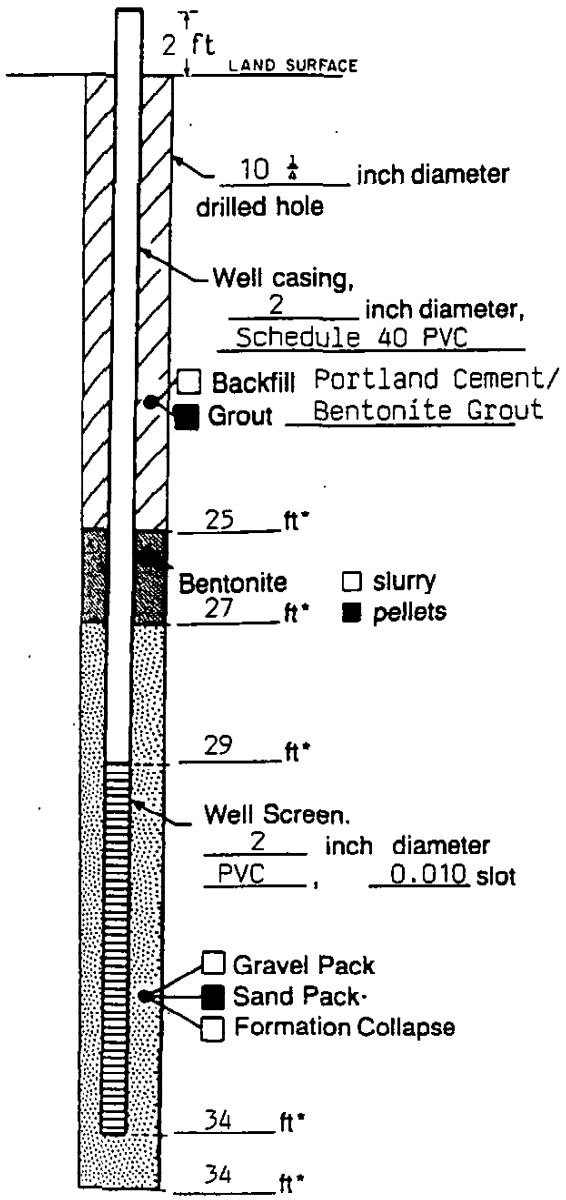
eraghty & Miller, Inc.

LITHOLOGIC LOG OF MONITOR WELL MW-14

Description	Depth (ft)	Thickness (ft)
ay, sandy, soft, gray to brown.....	0 - 1.5	1.5
lay, silty, soft to very soft, gray; ganics.....	1.5 - 10.5	9
Clay, silty, soft to very soft, gray; rganics.....	10.5 - 15	4.5
and, silty, loose to very loose, gray....	15 - 21	6
lay, silty, soft, gray.....	21 - 22.5	1.5
Clay, silty, soft to very soft, gray; hell fragments.....	22.5 - 28	5.5
Sand, silty, loose to firm, gray.....	28 - 30	2
and, silty, loose to firm, gray; anics.....	30 - 33	3
d, silty, firm, gray.....	33 - 34.5	1.5
Sand, clayey, loose, gray.....	34.5 - 36	1.5

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron - LA171.02 Well MW-14R
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) March 8-9, 1993
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid NA

Development Technique(s) and Date(s)
NA

Fluid Loss During Drilling NA gallo
Water Removed During Development NA gallo
Static Depth to Water NA feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose
Replacement solid waste compliance monitor well

Remarks

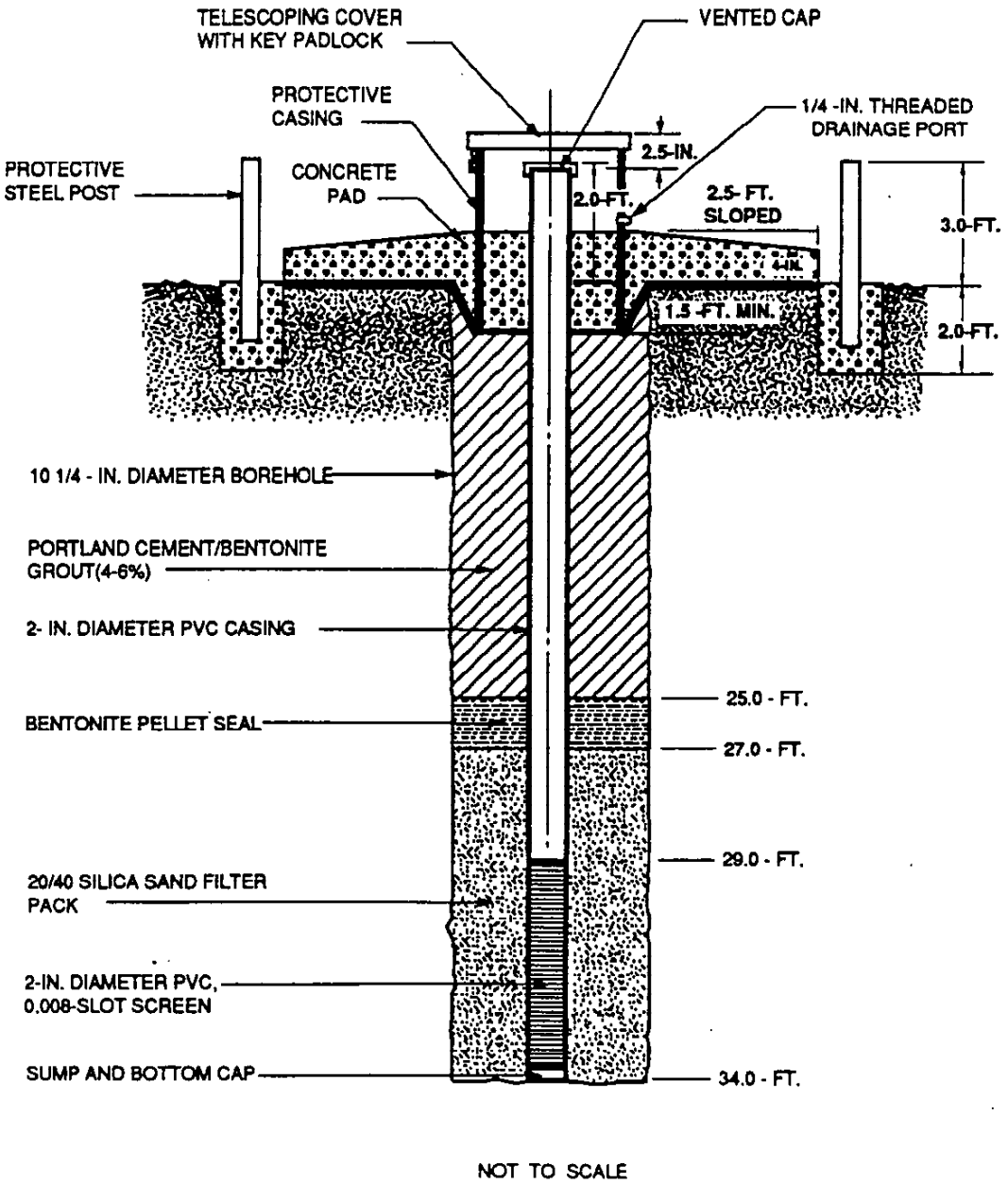
Prepared by Kipper W. Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-14R

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-14R

CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
SOLID WASTE GROUNDWATER MONITORING DATA

1) **A copy of your ground water monitoring plan as proposed to or approved by Department of Environmental Quality. This is to include all appropriate hydrogeological data, historic and current potentiometric evaluations, scaled site maps displaying all monitoring wells and piezometers. Also include details of water level measurements, well purging, sampling, preservation, chain of custody and analyzes (only reference test methods).**

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- Associated ditches- The upgradient well, MW-14, and the downgradient wells, MW-13 and MW-50 also comprise the monitoring for the ditches. These wells are completed in the "30-foot aquifer".

- Stormwater Impoundment Basin- The upgradient well, MW-15, and the downgradient wells, MW-16 and MW-17 comprise monitoring for the basin. These wells are also completed in the "30-foot aquifer".

Construction details of monitor wells MW-14, MW-13, M-50, MW-15, MW-16 and MW-17 are as follows:

Well	Top of Casing Elevation/Land Surface Elevation (feet, MSL)	Total Depth of Boring (Feet, below land surface)	Screen interval (Feet, below land surface)	PVC Well Diameter (inches)
MW-14	8.93/6.93	36	29-34	2
MW-13	7.78/5.78	34.5	26-31	2
MW-50	5.91/3.91	37	29-34	2
MW-15	11.73/9.73	49.5	13-18	2
MW-16	10.47/8.47	49.5	20-25	2
MW-17	10.91/8.91	35.5	27-32	2

WELL INFORMATION

Parameters / Well Number	MW-14	MW-13	MW-50	MW-15	MW-16	MW-17		
Latitude	29° 48' 50"	29° 48' 50"	29° 48' 50"	29° 48' 50"	29° 48' 50"	29° 48' 50"		
Longitude	90° 00' 37.5"	90° 00' 37.5"	90° 00' 37.5"	90° 00' 37.5"	90° 00' 37.5"	90° 00' 37.5"		
Type	Detection	Detection	Detection	Detection	Detection	Detection		
Unit monitored	*	*	*	**	**	**		
Up or down gradient	UP	DOWN	DOWN	UP	DOWN	DOWN		
Monitored zone thickness	5	7.5	10	16	6	1.5		
Construction	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC		
Sampling method	Bailer	Bailer	Bailer	Bailer	Bailer	Sampling Pump		
Casing elevation	8.93	7.78	5.91	11.73	10.47	10.91		
Well depth	36	34.5	37	49.5	49.5	35.5		
Screen interval, From	29	26	29	13	20	27		
To	34	31	34	18	25	32		
Elevation of water (MSL)	3.68	3.78	1.99	-1.9	-2.53	-2.34		
Gallons purged	15	15	16.2	4.3	12.2	10.9		
Date sampled	9/18/86	9/18/86	9/18/86	9/18/86	9/18/86	9/18/86		

* Solid Waste Stormwater Oil/Water Separator
** Solid Waste Stormwater Impoundment Basin

Geraghty & Miller, Inc.

LITHOLOGIC LOG OF MONITOR WELL MW-15

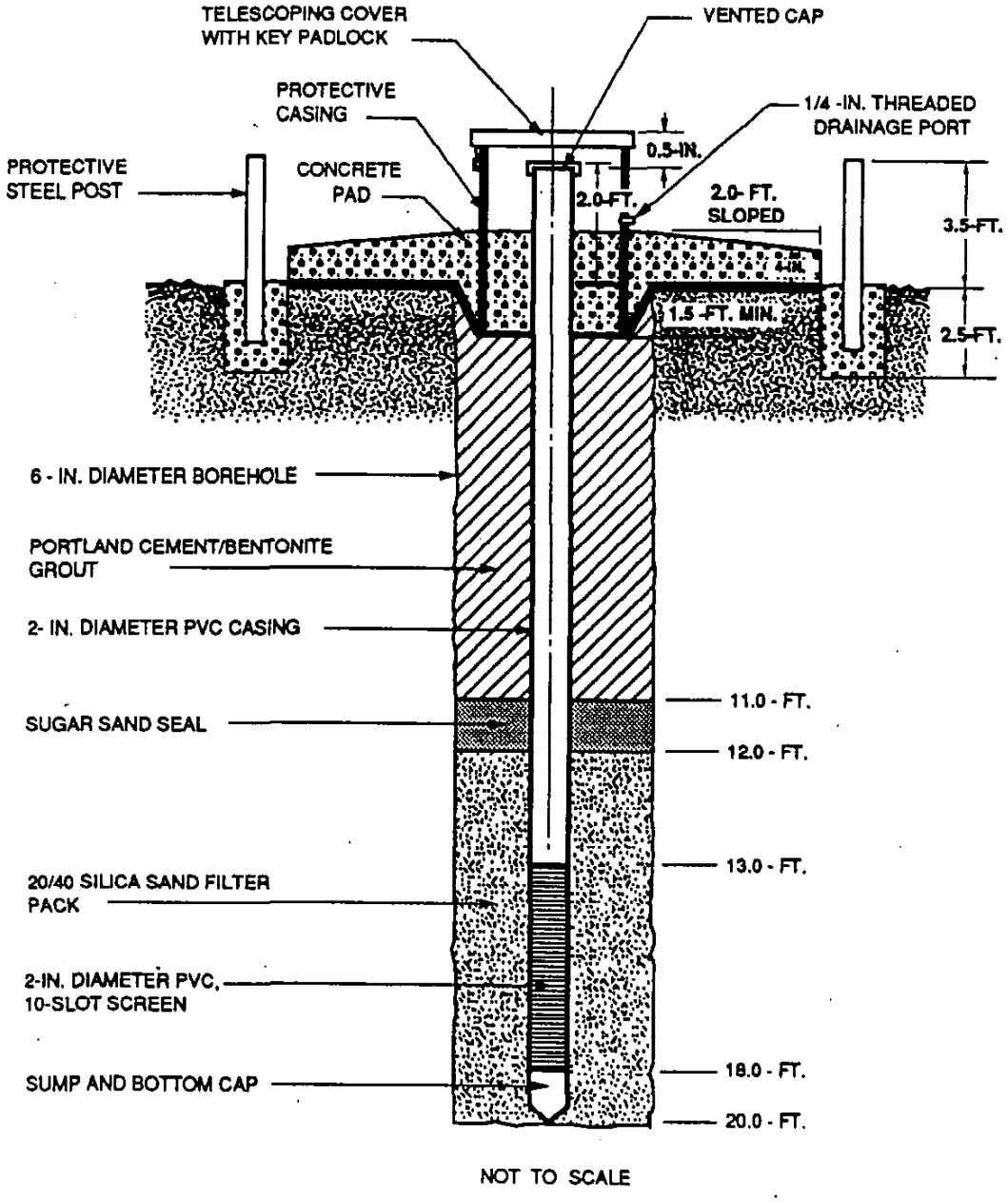
Description	Depth (ft)	Thickness (ft)
Clay, sandy, soft to very soft, brown with red streaks	0 - 1.5	1.5
Clay, silty, soft, gray to brown; organics	1.5 - 3	1.5
Clay, silty, soft, gray to black; organics; shell fragments	3 - 4.5	1.5
Clay, silty, very soft to firm, gray to greenish gray; sand lenses; organics	4.5 - 11	6.5
Silt, sandy, very soft to firm, gray to brown	11 - 18	7
Sand, silty, loose to firm, gray	18 - 27	9
No recovery	27 - 28.5	1.5
Clay, silty, very soft, gray; shell fragments	28.5 - 30	1.5
Clay, sandy, very soft to firm, gray	30 - 33	3
Sand, silty, loose, gray; trace of clay	33 - 35	2
Clay, silty, soft to firm, gray	35 - 36	1
Clay, silty, soft to firm, gray; trace of sand	36 - 37.5	1.5
Clay, silty, soft to firm, gray; sand lenses	37.5 - 40.5	3
Clay, sandy, soft to firm, gray	40.5 - 43.5	3
Clay, silty, soft, gray; sand lenses	43.5 - 46.5	3
Clay, silty, soft to very soft, gray	46.5 - 49.5	3

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO.
MW-15

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-15

Geraghty & Miller, Inc.

LITHOLOGIC LOG OF MONITOR WELL MW-16

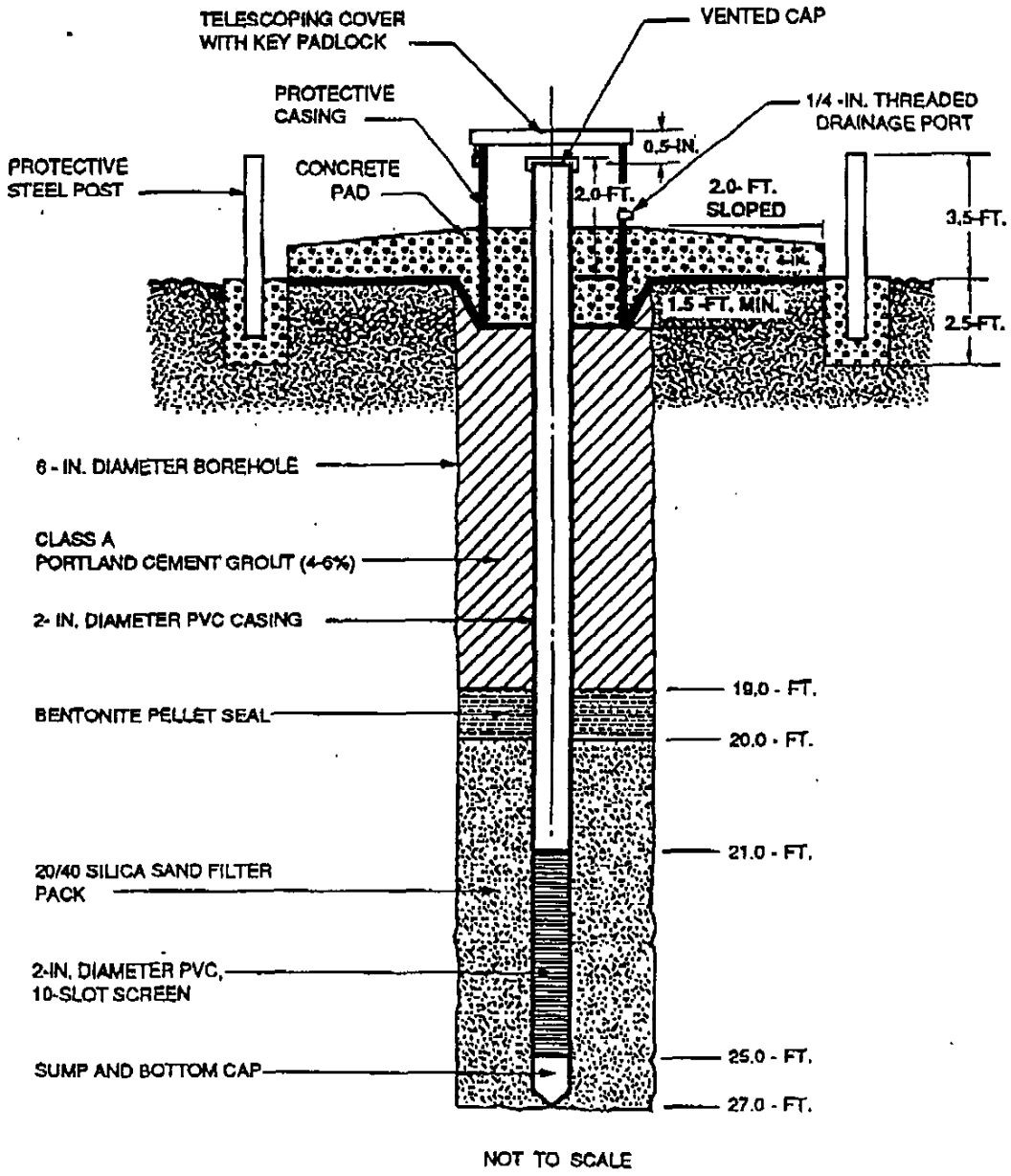
Description	Depth (ft)	Thickness (ft)
Clay, silty, soft to firm, gray to reddish brown; believed to be fill material; organics	0 - 6	6
Clay, silty, soft to firm, gray to brown; organics	6 - 12	6
Clay, silty, soft, gray to brown; organics; trace of sand	12 - 13.5	1.5
Clay, sandy, soft to very soft, gray; trace of silt	13.5 - 19.5	6
Silt, sandy, soft, gray	19.5 - 25.5	6
Clay, silty, soft, gray	25.5 - 27	1.5
Clay, silty, soft, gray; shell fragments	27 - 30	3
Sand, silty, loose to very loose, gray	30 - 35.5	5.5
Clay, silty, soft to very soft, gray; sand lenses	35.5 - 49.5	14

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-16

PROJECT CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-16

SAMPLE/CORE LOG

Boring/Well MW-16R Project No./Name K-5789, WA#3 Page 1 of ____

Site Location BASIN AREA Drilling Started 4/28/97 Drilling Completed 5/1/97

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum ____

Drilling Fluid Used NONE Drilling Method HOLLOW CORE AUGER

Drilling Contractor ECSTCS ENGINEERING Driller Pharoh Bassett Helper —

Prepared By RCT Hammer Weight NA Hammer Drop NA

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | > Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | < Water Level After 10 Min.

SAMPLE DEPTH (FEET)	SAMPLE TYPE	RECOVERY (FEET)	SYMBOL	VISUAL DESCRIPTION	REMARKS
0–					
10–					
20–					
30–					
40–					
50–					

Geraghty & Miller, Inc.

LITHOLOGIC LOG OF MONITOR WELL MW-17

Description	Depth (ft)	Thickness (ft)
Clay, silty, soft, gray; organics.....	19.5 - 21	1.5
Clay, silty, soft, gray; shell fragments..	24.5 - 26	1.5
Clay, silty, soft, gray.....	29.5 - 31	1.5
Sand, silty, loose, gray.....	34 - 35.5	1.5

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well MW-17R Project/No. - CHEVRON CHEMICAL COMPANY (LA171.02) Page 1 of 2

Site Location Belle Chasse, Louisiana Drilling Started 11/30/92 10:15 Drilling Completed 11/30/92 15:00

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Eustis Engineering Driller Eric Helper _____

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, ▽ Water First Encountered

Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	REMARKS
0				Clay, black and brown - silty (30/70), natural organics, stiff		No soil samples collected. Well placed based on previous boring for MW-17.
5				- rootlets throughout		
6				- silt partings		
10				- natural organics		
12				- some sand lenses		
20				Silty clay (25/75), soft, gray, natural organics throughout		
25						

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Screen 30/40

Boring/Well MW-17R Project/No. CHEVRON CHEMICAL COMPANY (LA171.02) Page 2 of 2

Site Location Belle Chasse, Louisiana Drilling Started 11/30/92 10:15 Drilling Completed 11/30/92 15:00

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Eustis Engineering Driller Eric Helper _____

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

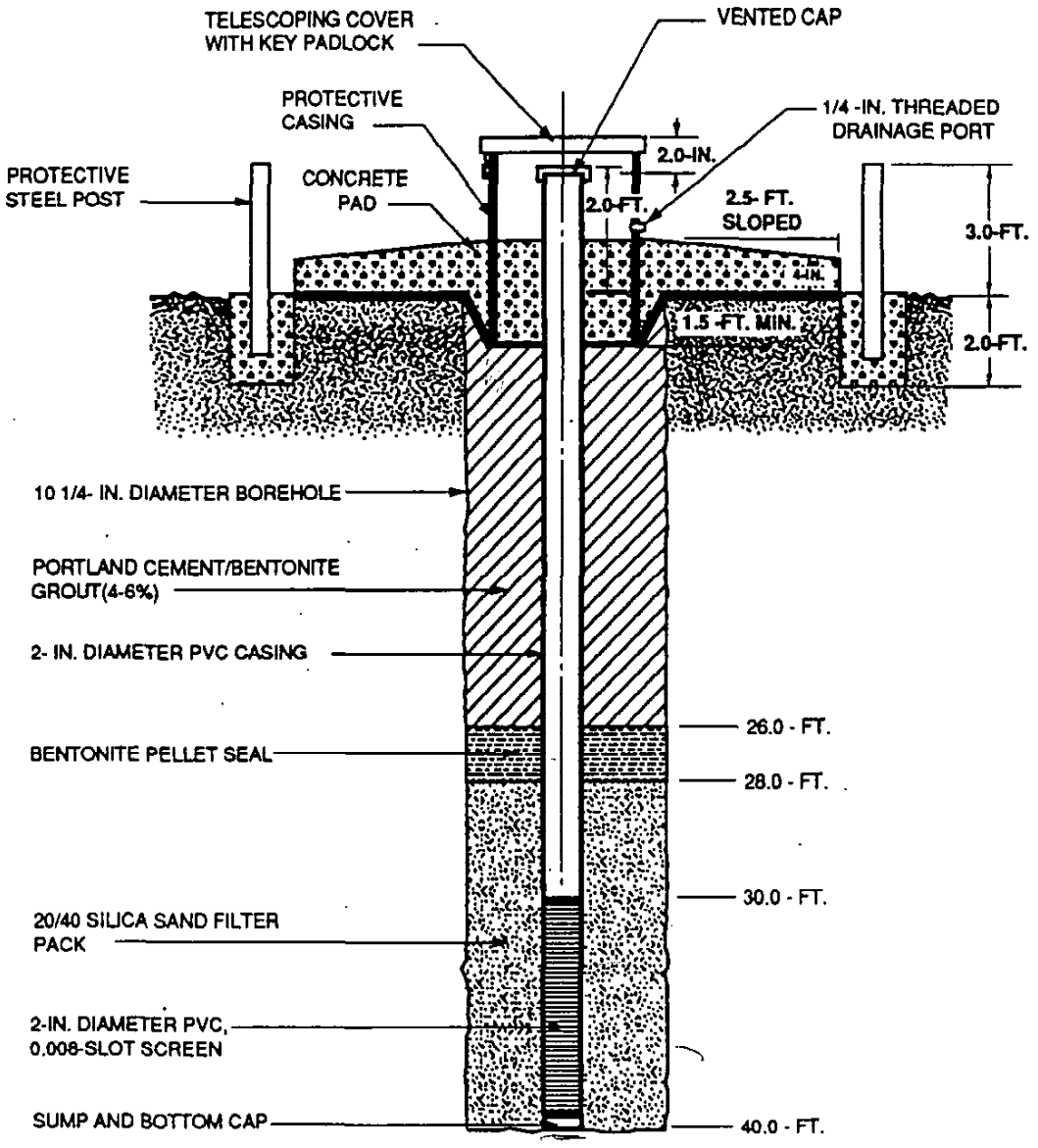
SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	REMARKS
25–30						No soil samples collected. Well placed based on previous boring for MW-17.
30–35				Silty clay (20/80), light gray, wet		
35–40				Silty sand (30/70), gray, wet		
40				Total Depth 40 ft bls		

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-17R

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



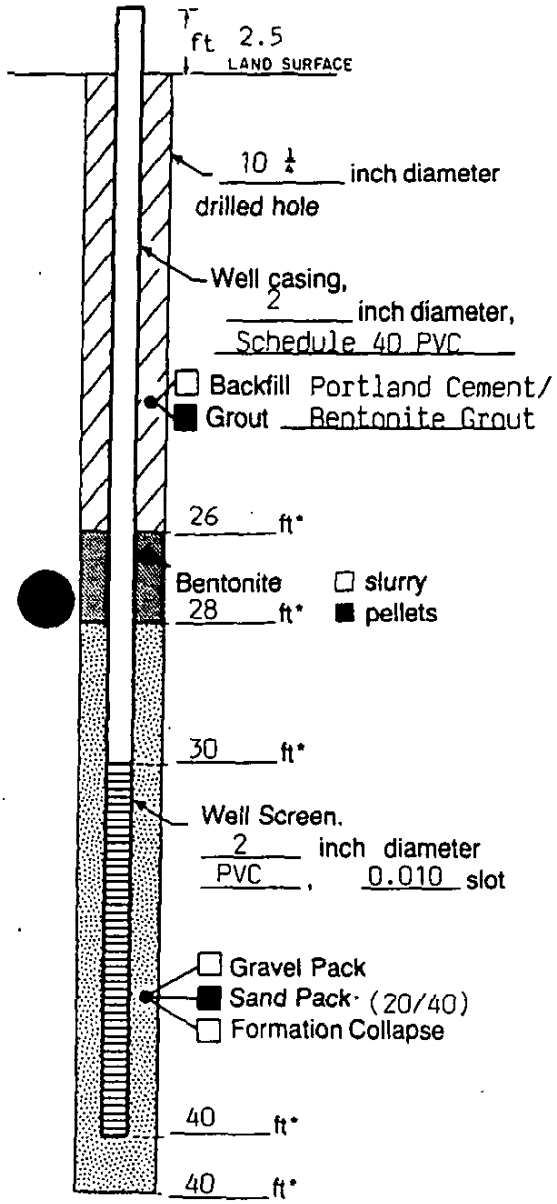
NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-17R

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron - LA171.02 Well MW-17R
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) November 30, 1992
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid NA

Development Technique(s) and Date(s)
Hand bailed with teflon bailer - 12/01/92

Fluid Loss During Drilling NA gallons
Water Removed During Development 37 gallons
Static Depth to Water NA feet below M.P.
Pumping Depth to Water NA feet below M.P.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose
Replacement to old well MW-17

Remarks Total depth is at 45 ft bls. Formation "flowed" on us.

Prepared by Kipper W. Montgomery

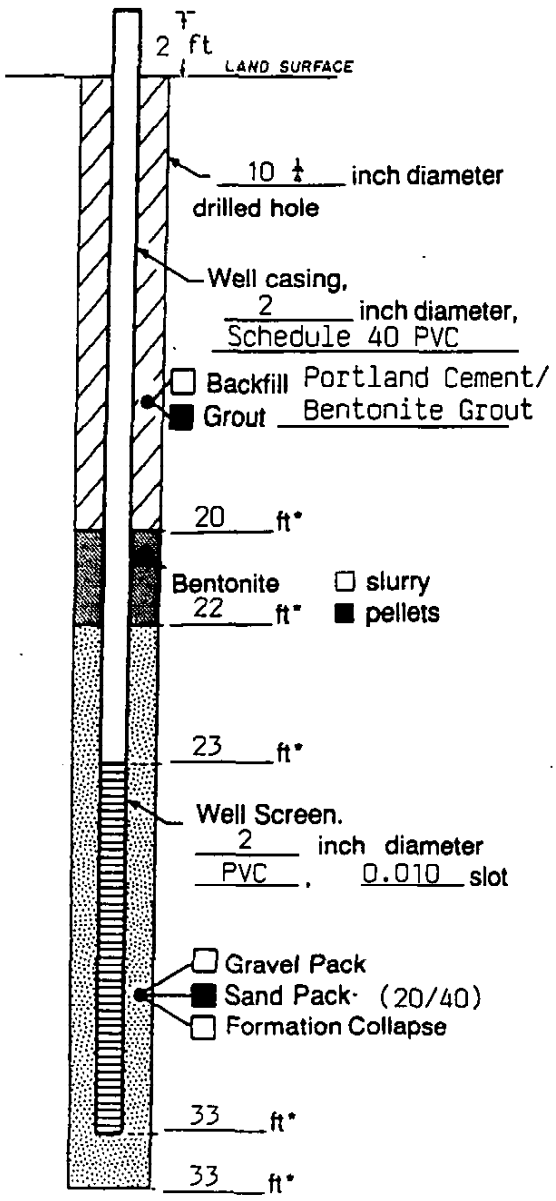
Geraghty & Miller, Inc.

LITHOLOGIC LOG OF MONITOR WELL MW-18

Description	Depth (ft)	Thickness (ft)
Clay, silty, soft to firm, gray to brown..	0 - 4.5	4.5
Clay, silty, very soft to soft, gray to brown; organics.....	4.5 - 15	10.5
Silt, sandy, loose to firm, gray.....	15 - 20	5
Sand, silty, firm, gray.....	20 - 24	4
Clay, silty, soft, gray; shell fragments..	24 - 27	3
Clay, silty, very soft, gray; trace of sand.....	27 - 28.5	1.5
Clay, silty, very soft, gray; sand lenses; shell fragments.....	28.5 - 30	1.5
Clay, silty, soft to firm, gray; shell fragments.....	30 - 31	1
Sand, silty, very loose to firm, gray.....	31 - 35.5	4.5
Clay, silty, soft, gray; sand lenses.....	35.5 - 40.5	5
Clay, sandy, soft, gray.....	40.5 - 42	1.5
Clay, silty, soft, gray.....	42 - 43.5	1.5
Clay, silty, very soft to stiff, gray; sand lenses.....	43.5 - 49.5	6

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron - LA171.02 Well MW-18R
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) December 1, 1992
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid NA

Development Technique(s) and Date(s)
NA

Fluid Loss During Drilling NA gallo
Water Removed During Development NA gallo
Static Depth to Water NA feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose
Replacement to old well MW-18

Remarks Total depth is a 35 ft bls.

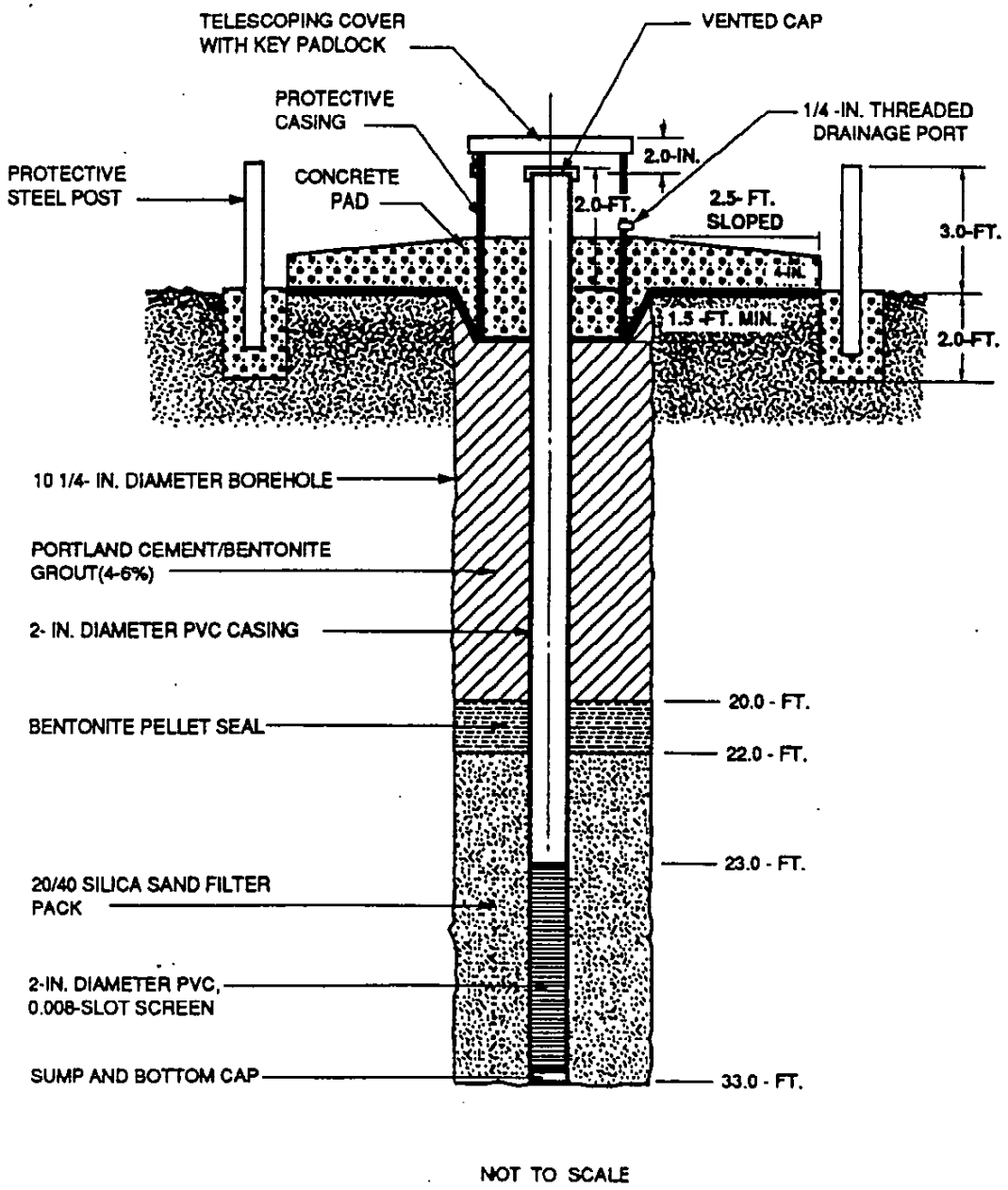
Prepared by Kipper W. Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-18R

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-18R

Screen 23/33

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well MW-18R Project/No. CHEVRON CHEMICAL COMPANY (LA171.02) Page 1 of 2

Site Location Belle Chasse, Louisiana Drilling Started 12/01/92 07:50 Drilling Completed 12/01/92 9:30

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Eustis Engineering Driller Eric Helper _____

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	REMARKS
0–15				Silty clay (40/60), dark brown, natural organics, stiff - rootlets		No soil samples collected. Well placed based on previous boring for MW-17.
15–17				Silty sand (30/60), brown to gray, moist, clayey		
17–20				Silty clay (25/75), moist, gray		
20–25				Sand (20/80), very fine, gray, wet, trace of clay		

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well MW-18R Project/No. CHEVRON CHEMICAL COMPANY (LA171.02) Page 2 of 2

Site Location *Belle Chasse, Louisiana* Drilling Started 12/01/92 07:50 Drilling Completed 12/01/92 09:30

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Eustis Engineering Driller Eric Helper _____

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | Water Level After 10 Min.

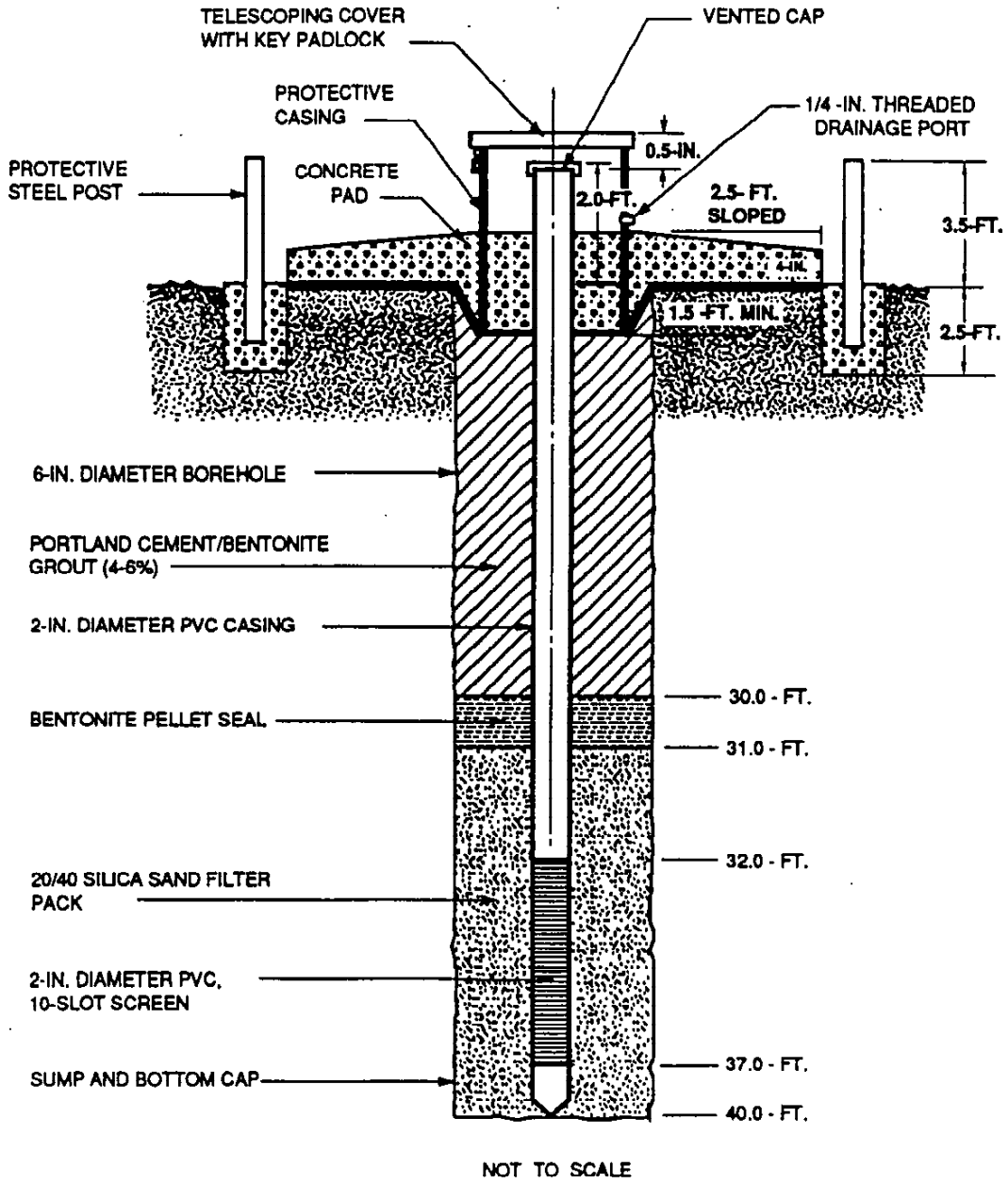
SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	REMARKS
25						
26				Clay, soft, silty (3%), gray, shell fragments		No soil samples collected. Well placed based on previous boring for MW-17.
27						
28						
29						
30				- trace of sand, moist		
31						
32						
33				Silty sand (35/65), loose, gray		
34						
35				**Total Depth 35 ft bls**		

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-50

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-47

CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
SOLID WASTE GROUNDWATER MONITORING DATA

1) **A copy of your ground water monitoring plan as proposed to or approved by Department of Environmental Quality. This is to include all appropriate hydrogeological data, historic and current potentiometric evaluations, scaled site maps displaying all monitoring wells and piezometers. Also include details of water level measurements, well purging, sampling, preservation, chain of custody and analyzes (only reference test methods).**

The LDEQ approved our solid waste groundwater monitoring program. Our facility received a Solid Waste Permit (Permit No. P-0112-A1) on July 28, 1986. The following attachments contain the requested data:

Attachment #1: Hydrogeological data.
Attachment #2: Potentiometric data and location of monitor wells.
Attachment #3: Site maps.
Attachment #4: Sampling and analysis plan.

The approved groundwater monitoring network consists of one upgradient well and two downgradient wells for each facility as per section 7.3.3 of the Louisiana Solid Waste Rules and Regulations:

- Stormwater Oil/Water Separator- The upgradient well, MW-14, and the downgradient wells, MW-13 and MW-50 comprise monitoring for the separator. These wells are completed in the "30-foot aquifer". This is considered the uppermost aquifer and has been identified as a continuous layer of silty sand and underlying the facility at a depth of approximately 30 feet.

- Associated ditches- The upgradient well, MW-14, and the downgradient wells, MW-13 and MW-50 also comprise the monitoring for the ditches. These wells are completed in the "30-foot aquifer".

- Stormwater Impoundment Basin- The upgradient well, MW-15, and the downgradient wells, MW-16 and MW-17 comprise monitoring for the basin. These wells are also completed in the "30-foot aquifer".

Construction details of monitor wells MW-14, MW-13, M-50, MW-15, MW-16 and MW-17 are as follows:

Well	Top of Casing Elevation/Land Surface Elevation (feet, MSL)	Total Depth of Boring (Feet, below land surface)	Screen interval (Feet, below land surface)	PVC Well Diameter (inches)
MW-14	8.93/6.93	36	29-34	2
MW-13	7.78/5.78	34.5	26-31	2
MW-50	5.91/3.91	37	29-34	2
MW-15	11.73/9.73	49.5	13-18	2
MW-16	10.47/8.47	49.5	20-25	2
MW-17	10.91/8.91	35.5	27-32	2

WELL INFORMATION

Parameters / Well Number	MW-14	MW-13	MW-50	MW-15	MW-16	MW-17		
Latitude	29° 48' 50"	29° 48' 50"	29° 48' 50"	29° 48' 50"	29° 48' 50"	29° 48' 50"		
Longitude	90° 00' 37.5"	90° 00' 37.5"	90° 00' 37.5"	90° 00' 37.5"	90° 00' 37.5"	90° 00' 37.5"		
Type	Detection	Detection	Detection	Detection	Detection	Detection		
Unit monitored	*	*	*	**	**	**		
Up or down gradient	UP	DOWN	DOWN	UP	DOWN	DOWN		
Monitored zone thickness	5	7.5	10	16	6	1.5		
Construction	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC		
Sampling method	Bailer	Bailer	Bailer	Bailer	Bailer	Sampling Pump		
Casing elevation	8.93	7.78	5.91	11.73	10.47	10.91		
Well depth	36	34.5	37	49.5	49.5	35.5		
Screen interval, From	29	26	29	13	20	27		
To	34	31	34	18	25	32		
Elevation of water (MSL)	3.68	3.78	1.99	-1.9	-2.53	-2.34		
Gallons purged	15	15	16.2	4.3	12.2	10.9		
Date sampled	9/18/86	9/18/86	9/18/86	9/18/86	9/18/86	9/18/86		

* Solid Waste Stormwater Oil/Water Separator
** Solid Waste Stormwater Impoundment Basin

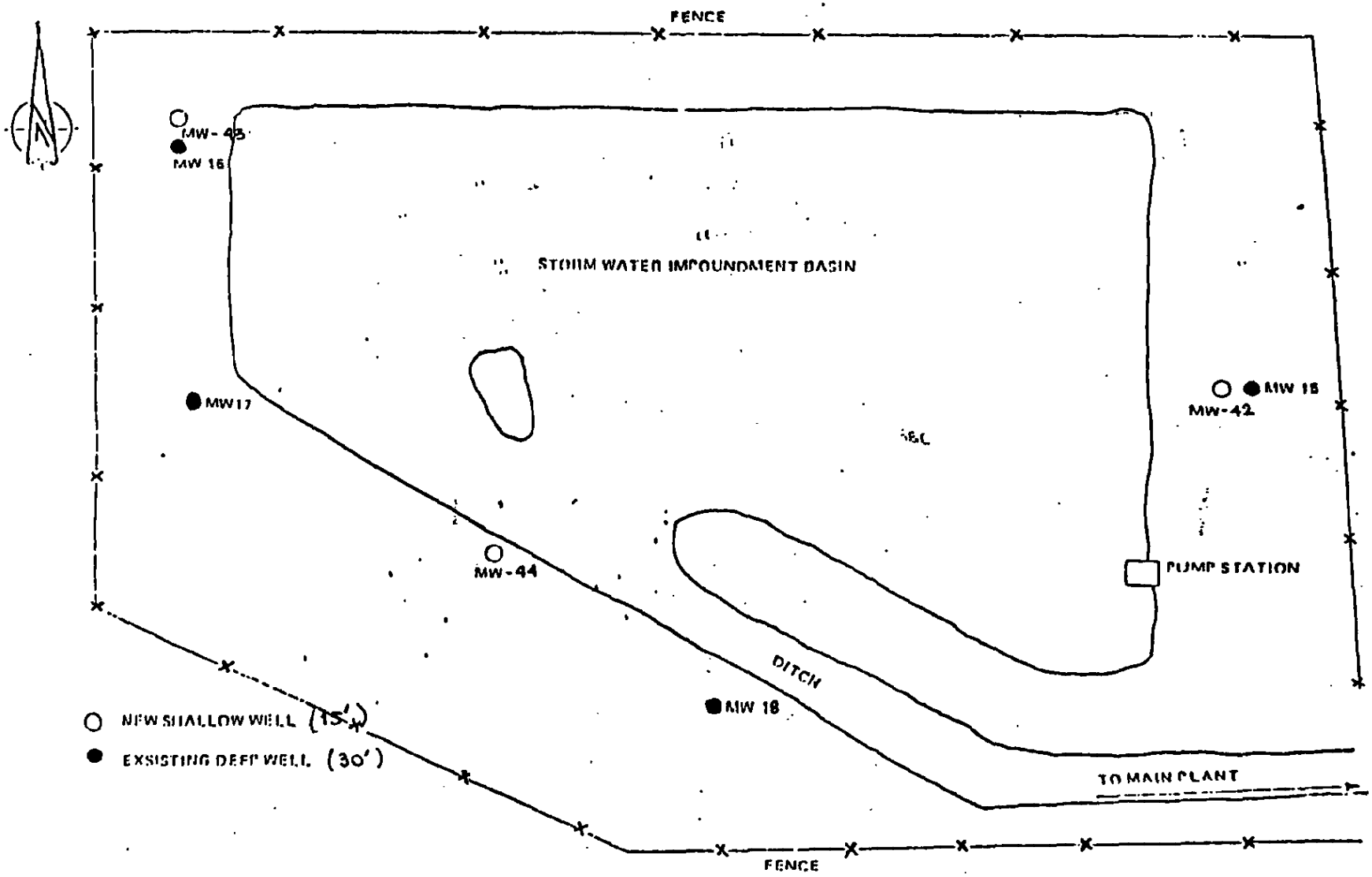


Figure 2. LOCATION OF MONITORING WELLS FOR STORM WATER IMPOUNDMENT BASIN

TABLE 2

MONITORING WELL INSTALLATION LOG

MW-42

Date Drilled: 6/27/83

Location: Adjacent to MW 15

Stratigraphy: 0 - 12 ft. Moderately dense grey clay with traces of sand.

Well Construction:

Installed 5 ft. of 1.25-inch PVC screen and 10 ft. of 1.25-inch PVC casing. Put 12 inches coarse sand in the bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 12-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 3 ft. Top of PVC casing elevation is 9.80 ft. above msl.

MW-43

Date Drilled: 6/27/83

Location: Adjacent to MW 16

Stratigraphy: 0 - 0.5 ft. Brick and other debris.

0.5 - 12 ft. Same as MW-42.

Well Construction:

Installed 5 ft. of 1.25-inch PVC screen and 10 ft. of 1.25-inch PVC casing. Put 12 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 12-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 3 ft. Top of PVC casing elevation is 8.91 ft. above msl.

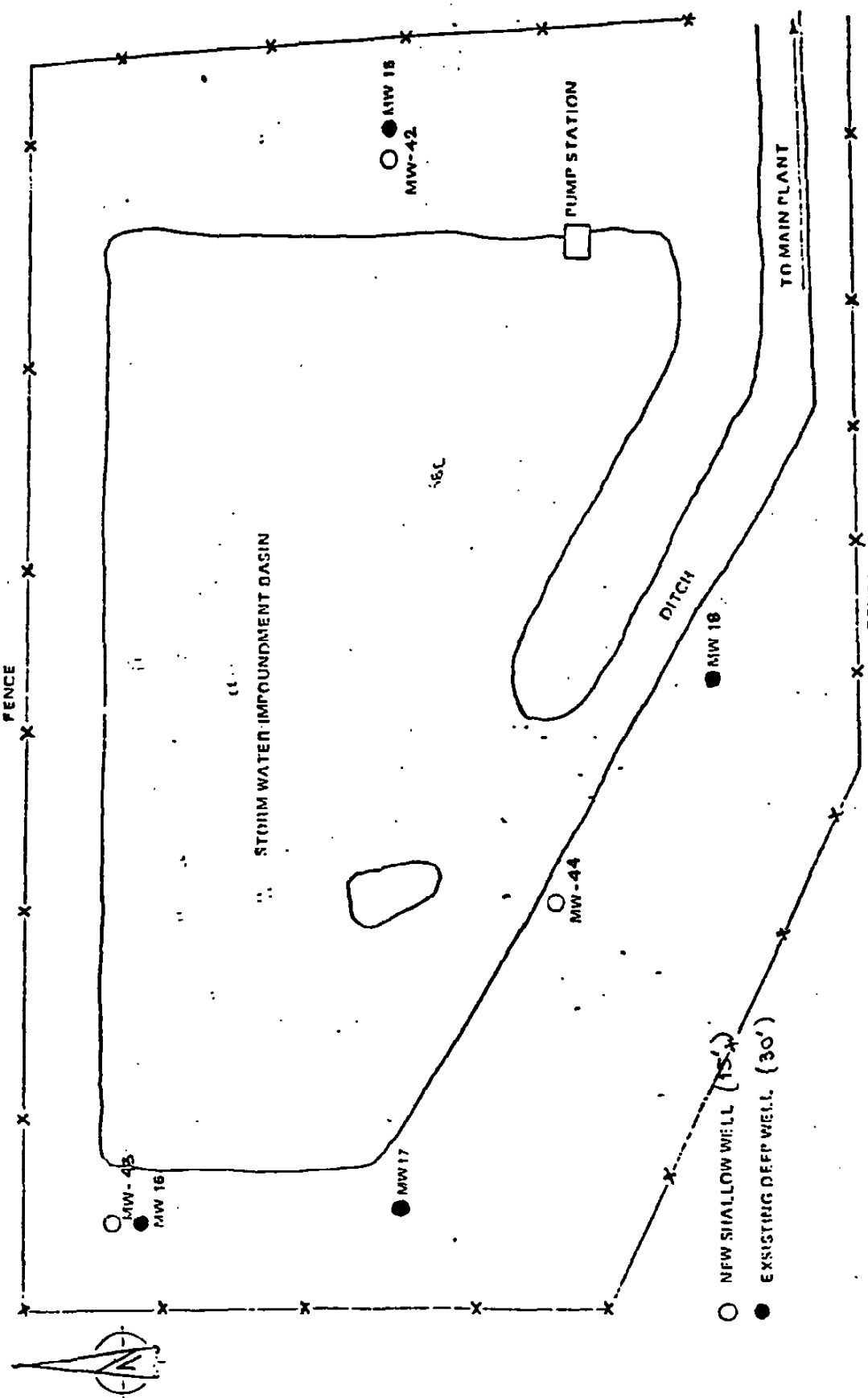


Figure 2. LOCATION OF MONITORING WELLS FOR STORM WATER IMPOUND-MENT BASIN

TABLE 2

MONITORING WELL INSTALLATION LOG

MW-42

Date Drilled: 6/27/83

Location: Adjacent to MW 15

Stratigraphy: 0 - 12 ft. Moderately dense grey clay with traces of sand.

Well Construction:

Installed 5 ft. of 1.25-inch PVC screen and 10 ft. of 1.25-inch PVC casing. Put 12 inches coarse sand in the bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 12-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 3 ft. Top of PVC casing elevation is 9.80 ft. above msl.

MW-43

Date Drilled: 6/27/83

Location: Adjacent to MW 16

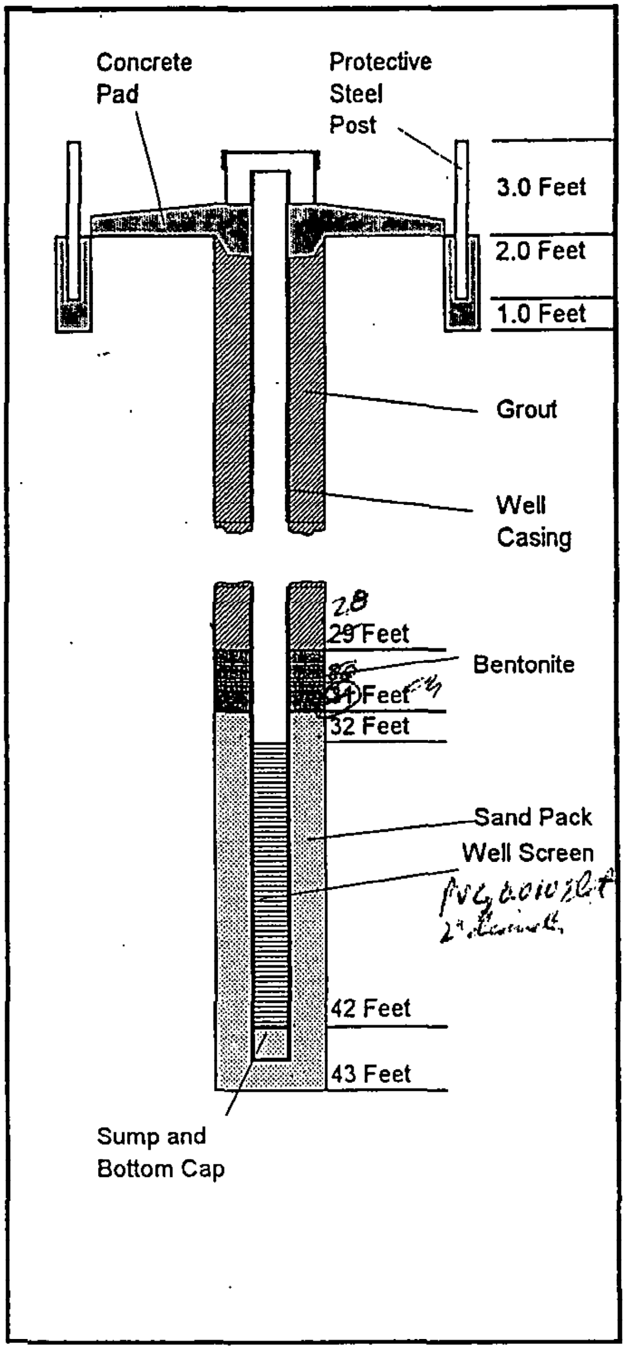
Stratigraphy: 0 - 0.5 ft. Brick and other debris.

0.5 - 12 ft. Same as MW-42.

Well Construction:

Installed 5 ft. of 1.25-inch PVC screen and 10 ft. of 1.25-inch PVC casing. Put 12 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 12-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 3 ft. Top of PVC casing elevation is 8.91 ft. above msl.

WELL CONSTRUCTION LOG



Project K-5309, WA#3 **Well** MW-16R

Town/City ~~[illegible]~~ [illegible]

Parish Plaquemines **State** LA

Installation Date(s) 4-29-97

Drilling Method Hollow Stem Auger

Contractor Eustis Engineering

Drilling Fluid None

Development Technique(s) and Date(s)

Hand Bailed (5/12/97)

Pumped (5/13/97)

Water Removed During Develpment None

Well Purpose Groundwater Monitoring well Replaces MW-16

Remarks

Prepared by R C [signature]

SAMPLE/CORE LOG

Boring/Well MW-16R ProjectNo./Name BASIN Page 1 of 1

Site Location BASIN Drilling Started ______ Drilling Completed ______

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used ______ Drilling Method ______

Drilling Contractor ______ Driller ______ Helper ______

Prepared By ______ Hammer Weight ______ Hammer Drop ______

Legend: Fill; Silty Clay; Silt; Sandy Silt; Silty Sand; Shelby Tube; > Water First Encountered; Clay; Sandy Clay; Clayey Silt; Sand; Clayey Sand; Split Spoon; < Water Level After 10 Min.

SAMPLE DEPTH (FEET)	SAMPLE TYPE	RECOVERY (FEET)	SYMBOL	VISUAL DESCRIPTION	REMARKS
0			Fill		
10–12 Spoon	Clay w/ Brick				
12–16	Clay Silt				
16–20	Silt/Sand				
20–22 Spoon					
22–26	ST	SH/Clay		20/27 55	21/25
26–30	Clay Silt				
30–34		Clay/Silt stringer		32	
34–38		Silt/Sand/Clay			32/42
38–40 Spoon				SS Sand SS	
50					

SAMPLE/CORE LOG

Boring/Well MW-10R ProjectNo./Name K-5309, WA#3 Page 1 of ____

Site Location BASIN AREA Drilling Started 4/28/97 Drilling Completed 5/1/97

Land-Surface Elev. ________ feet ☐ Surveyed ☐ Estimated Datum ________

Drilling Fluid Used None Drilling Method Hollow Core Auger

Drilling Contractor Estes Engineering Driller Patrick Bossett Helper —

Prepared By RCT Hammer Weight NA Hammer Drop NA

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | > Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | < Water Level After 10 Min.

SAMPLE DEPTH (FEET)	SAMPLE TYPE	RECOVERY (FEET)	SYMBOL	VISUAL DESCRIPTION	REMARKS
0					
10					
20					
30					
40					
50					

GEOTECHNICAL INVESTIGATION

CHEVRON CHEMICAL COMPANY

OAK POINT PLANT

STORMWATER PUMPING STATION

BELLE CHASSE, LOUISIANA

CONTRACT NO. K-7435

EUSTIS ENGINEERING PROJECT NO. 18916

FOR
CHEVRON CHEMICAL COMPANY
BELLE CHASSE, LOUISIANA

By
Eustis Engineering Company, Inc.
Metairie, Louisiana

26 JULY 2005

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BELLE CHASSE, LOUISIANA
CONTRACT NO. K-7435
EUSTIS ENGINEERING PROJECT NO. 18916

INTRODUCTION

1. This report contains the results of a geotechnical investigation performed for the proposed stormwater pumping station at Chevron Chemical Company's Oak Point Plant in Belle Chasse, Louisiana. The investigation was performed in general accordance with Eustis Engineering Company, Inc.'s proposal dated 18 May 2005. Authorization to proceed was given through Chevron Chemical Company Contract No. K-7435 dated 21 May 2005.

2. This report has been prepared in accordance with generally accepted geotechnical engineering practice for the exclusive use of Chevron Chemical and their designated representatives for specific application to the subject site. In the event of any changes in the nature, design, or location of the proposed structure, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified and verified in writing. Should these data be used by anyone other than Chevron Chemical and their designated representatives, they should contact Eustis Engineering for interpretation of data and to secure any other information pertinent to this project.

3. The analyses and recommendations contained in this report are based in part on data obtained from the soil boring. The nature and extent of variations in subsoil conditions away from the boring location may not become evident until construction. If variations then appear, it will be necessary to reevaluate the recommendations contained in this report.

4. Recommendations and conclusions contained in this report are to some degree subjective and should be used only for design purposes. This report should not be included in the contract plans and specifications. However, the results of the soil boring and laboratory tests contained in the Appendix of this report may be included in the plans and specifications.

SCOPE

5. The investigation included the drilling of a soil test boring to evaluate subsoil conditions and stratification, and to obtain samples of the various substrata. Soil mechanics laboratory tests, performed on samples obtained from the boring, were used to evaluate the physical properties of the subsoils. Engineering analyses, based on the soil boring and laboratory tests, were made to develop allowable pile load capacities, estimates of settlement, and general construction recommendations. An evaluation of the stability of the stormwater impoundment basin bank was also performed. In addition, analyses were performed to develop recommendations for a proposed cofferdam.

SOIL BORING

6. One undisturbed sample type soil test boring, 75 feet in depth, was made at the site on 23 May 2005. The approximate location of the boring is shown on Figure 1. A detailed descriptive log of the boring and laboratory tests is shown in both tabular and graphical form in the Appendix. Upon completion of drilling the boring, the hole

was backfilled with cement-bentonite grout in accordance with current regulatory requirements.

Undisturbed Boring

7. The undisturbed soil boring was made with a truck mounted rotary type drill rig. Undisturbed samples of cohesive or semi-cohesive subsoils were obtained at close intervals or changes in strata using a 3-in. diameter thinwall Shelby tube sampler. The samples were immediately extruded from the sampler, inspected, and visually classified by Eustis Engineering's soil technician. Pocket penetrometer tests were performed on the soil samples to give a general indication of their shear strength or consistency. The results of these tests are shown on the boring log under the column heading "PP." Representative samples were then promptly placed in moisture proof containers and sealed for preservation of their natural moisture content.

8. Samples of cohesionless and semi-cohesive materials were obtained during the performance of in situ Standard Penetration Tests. This test consists of driving a 2-in. diameter sampler 1 foot into the soil after first seating it 6 inches. A 140-lb weight dropped 30 inches is used to advance the sampler. The number of blows required to drive the sampler is indicative of the relative density of cohesionless soils and the consistency of cohesive soils. The samples were retained in moisture proof containers for preservation of their natural moisture content. The results of the Standard Penetration Tests are shown on the boring log under the column heading "SPT."

LABORATORY TESTS

9. Soil mechanics laboratory tests, consisting of natural water content, unit weight, and either unconfined compression shear (UC) or one-point unconsolidated undrained

triaxial compression shear (OB), were performed on samples obtained from the undisturbed boring. The results of the laboratory tests are summarized on the boring log in the Appendix.

10. A grain size analysis was also performed on a selected sample of cohesionless soil obtained from the boring to determine its particle distribution (PD) curve. The results of this test are shown on a separate sheet following the boring log in the Appendix.

DESCRIPTION OF SUBSOIL CONDITIONS

Topography

11. The pumping station structure will be located approximately 30 feet into the stormwater impoundment basin. At the proposed location of the station, the mudline is at approximate el -3.5 to el -6.7 (MSL). Boring 1 was made at the top of the bank of the basin at approximate el 8. Water levels within the impoundment fluctuate between el 0 and el -4.

Stratigraphy

12. Reference to the log of the boring indicates approximately 6 inches of compact white shells were encountered and are underlain by 18 inches of medium dense brown silty sand with clayey silt layers. Medium stiff gray and tan silty clay and clay were encountered to the 11-ft depth followed by medium compact gray sandy silt and clayey silt to the 18.5-ft depth. Deposits of medium dense gray silty sand were then encountered to the 26-ft depth. Very soft to medium stiff gray clay and silty clay were then encountered to the final boring depth of 75 feet below the existing ground surface. A stratum of loose gray clayey silt with sandy silt layers was encountered between the 36 and 41-ft depths.

Ground Water

13. In order to determine the ground water conditions at the time of the field investigation, observations were made in an auger boring drilled approximately 4 feet north of the boring. The boring was advanced without the addition of water to a depth of 15 feet. Free water was initially encountered at a depth of 12 feet. After a period of approximately six hours, the hole was observed to be dry and caved at a depth of 11 feet. The depth to ground water will vary with climatic conditions, drainage improvements, levels in the stormwater impoundment basin and nearby Mississippi River, and other factors. The depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

FOUNDATION ANALYSIS

Furnished Information

14. A layout of the proposed structure was furnished by Chevron Chemical. The project will consist of a pile supported stormwater pumping station located within the stormwater impoundment basin. The pumping station will have plan dimensions of approximately 17' x 19' and will support two 3,000-gpm pumps. Structural loads are estimated to be approximately 25 tons. The structure is to be supported on six 8-in. diameter steel pipe piles. Piping will be required from the pumping station to the bank of the basin. A pile supported bent will be constructed between the station and the bank for support of the piping. Minimum pile spacings were furnished as 7 feet, 8 inches. Piping at the bank will be grade supported. Beneath the station platform, a sump will be excavated to approximate el -11 (MSL). The cofferdam will have approximate plan dimensions of 20' x 20'. A vibratory hammer will be utilized to install all piles, casing, and sheetpiles. Eustis Engineering was furnished a

proposed construction plan contained in Chevron Chemical's letter to the State of Louisiana, Department of Environmental Quality, dated 31 May 2005.

Foundation Recommendations

15. Our recommendations assume the furnished construction plan will be followed. Should changes be made to the proposed construction sequence, Eustis Engineering should be contacted to reevaluate the recommendations contained in this report. The proposed structures may be supported on deep foundations consisting of the proposed 8-in. diameter open end steel pipe piles. All structural loads from each feature should be supported on piles having the same tip embedments in order to minimize differential settlement. We understand project requirements will not allow for performance of a static load test over dynamic pile testing. Therefore, we recommend a factor of safety of 2.5 be used for pile foundations.

16. In order to provide cutoff of permeable substrata, we recommend casing and sheetpiles be installed to at least el -23, though deeper embedments may be required for structural considerations as provided herein.

17. Recommendations are not provided for the piping that crosses the roadway on the southern side of the impoundment. These features were installed prior to this investigation.

Deep Foundations

18. Allowable Pile Load Capacities. Analyses have been made to determine the estimated allowable single pile load capacities in compression and tension for 8-in. diameter open end steel pipe piles for support of the proposed structures. The results of these analyses are shown on Figure 2.

19. Our allowable pile load capacities neglect the capacity to el -23 for embedment of the pile within the casing and grouting procedures as outlined in the proposed construction sequence. These allowable pile load capacities also contain an estimated factor of safety of 2.5 against failure of a single pile through the soil. The allowable pile load capacities shown on Figure 2 also include a 20% reduction for installation by a vibratory hammer.

20. Open End Steel Pipe Piles. We recommend the open end steel pipe piles meet the requirements outlined in Section 1013.11 of the Louisiana Standard Specifications for Roads and Bridges, 2000 edition (LSSRB). The steel piles should be designed to have wall thicknesses that are structurally sufficient to withstand handling and driving stresses. The pile dimensions assumed in our analyses are based primarily on the outside pile diameter. The actual wall thickness selected for the open end pile will generally not affect our estimated vertical capacities.

21. Protrusion of Connections or Welds. Pile connections that protrude beyond the surface of the outside wall of the pile reduce the frictional resistance acting on the pile surface above the protrusion. For this reason, we recommend against the use of spiral welded piles and closed end pipe piles. We further recommend all pile welds be ground flush with the surface of the pile.

22. Structural Capacity. Analyses for pile capacities are based on a soil-pile relationship only. Therefore, the structural capacity of the piles and their connections to transmit these loads should be determined by a structural engineer. The estimates of pile capacities presented herein do not include the weight of the pile.

23. Pile Group Capacity. Eustis Engineering has reviewed the furnished pile layout plan. For the proposed layout, the effects of group action on the basis of group perimeter shear with regards to vertical pile capacity should be minimal and the

allowable pile load capacity may be taken as the sum of the individual pile load capacities. The proposed spacing of the piles exceeds minimum spacing requirements. Should pile spacing or group dimensions differ from those furnished, Eustis Engineering should be contacted to reevaluate the effects of group action.

24. Estimated Settlement Due to Structural Loads. We recommend the structure be constructed as rigidly as possible to minimize the potential for differential settlements. Based on the furnished pile layout, we estimate settlement of piles with minimum embedments to el -40 to be ¼ to ½ inch due to furnished structural loads.

25. These estimates do not include elastic deformation of the piles which should be added to the settlement estimates. Elastic deformation of the piles may be estimated as 67% to 75% of the static column strain of a pile acting as a column. ***These estimates of settlement are due to structural loads only.***

26. Differential Settlement. Your design should recognize the potential for differential settlement between pile supported features and grade supported features. A joint allowing vertical movements should be provided between any grade supported and pile supported features to accommodate potential differential settlement. In addition, the structure should be designed as rigidly as possible to minimize the potential for differential settlement.

Installation of Piles and Casing

27. Quality Control. We understand piles and casing will be installed using vibratory equipment. Close field supervision should be maintained by experienced personnel to ensure proper procedures are followed and accurate records are kept for all pile installation operations. The installation record should include, as a minimum, the date, the start and end times of individual pile installation, the type and size of pile,

overall length, inner and outer diameters, wall thickness, embedment below a reference datum, depth and diameter of casing, depth and diameter of prepunch or predrill, and hammer type. An accurate installation record is especially important to verify the piles are installed to the required tip embedment and that all other specifications have been met.

28. Predrilling. Predrilling may be required to aid in installation of casing through underlying sand deposits. Based on the boring log, the relative density of these deposits is medium dense and should not create significant driving problems for steel casing installed using vibratory methods. However, the project specifications should address the potential for predrilling. Due to the variable nature of the deposits, high penetration resistances should be anticipated. A pilot hole has the potential of minimizing vibrations resulting from pile installation operations or reducing the potential damage to piles. The predrill bit should be no larger than approximately 80% of the diameter for pipe piles. Predrilling should be made by wet rotary methods. Predrilling should not extend beyond el -20. Eustis Engineering should be contacted if a deeper pilot hole is necessary.

29. Dynamic Analysis. The steel pipe piles should be designed by a structural engineer to have a cross-section which is structurally sufficient to facilitate driving of the piles without damage. Dynamic analyses (WEAP) can be performed to evaluate driving stresses and driveability once the hammer and appurtenant equipment have been selected. Structural requirements can then be verified by a structural engineer and installation criteria can be established.

Slope Stability

30. Design Methodology and Assumptions. Excavation for the proposed sump will affect the stability of the basin bank. A cross-section of the bank was provided by Chevron Chemical. Stability analyses were performed using the U.S. Army Corps

of Engineers' UPLIFT program which incorporates the LMVD Method of Planes Analysis. A factor of safety of 1.3 is typically required for bank stability. This method utilizes a plane-strain evaluation of slope stability which assumes the excavation with infinite extent in the direction parallel to the bank. In reality, the excavation is relatively narrow in the direction parallel to the bank. Therefore, in cases where the LMVD Method of Planes Analysis indicates a factor of safety of less than 1.3, a conservative three-dimensional analysis assuming a triangular distribution was performed to consider the excavation in three dimensions. This method is described on Figure 4. The design parameters selected are shown on the stability plates provided as Figures 3 and 4. A low water level in the basin at el -4 was furnished by Chevron Chemical for use in our analyses. Our analyses consider an excavation having plan dimensions of 20' x 20' to el -11.

31. Our analyses indicate global stability of the bank, with regards to failure into the basin, exists at a factor of safety of approximately 1.38 for the current bank configuration. The results of these analyses are shown on Figure 3. Considering an infinitely wide excavation to el -11 for the sump, we estimate the factor of safety to be 1.13. Results of the three-dimensional analysis show a minimum calculated factor of safety of 1.32. Our results of the three-dimensional analysis, shown on Figure 4, consider an excavation having plan dimensions of 20' x 20'. Should low water levels below el -4 be proposed, Eustis Engineering should reevaluate bank stability.

Cofferdam

32. Sheetpile Wall. We have analyzed the southern wall of the cofferdam which is the wall supporting the greatest earth load. Ground surface elevations on the northern and southern walls of the cofferdam are shown on Figure 4. Our analyses assume the top of the sheetpile sections to be at approximate el 0 and the bottom of the excavation to be at el -11. Furnished information indicates the excavation will not

be dewatered and low water levels were assumed at el -4. Based on these analyses, the sheetpiles should extend to el -40 (approximate 40-ft sheetpiles). This penetration contains a factor of safety of approximately 1.3 applied to the soil parameters. We estimate the maximum bending moment in the sheetpile sections to be 19.5 kips-ft per linear foot of wall acting at approximate el -16. The moment diagram is shown on Figure 5. The maximum scaled deflection is estimated to be 6.7×10^9 lb-in^3. To obtain deflection in inches, divide scaled deflection by the product of the modulus of elasticity (psi) and the moment of inertia (in.^{4}). Our estimate of deflection does not consider support from the proposed H-Beam frame. Our analyses also assume adhesion of the soil to the steel sheetpiles equal to 50% of the undrained shear strengths. The net pressure diagrams for the southern walls are shown on Figures 6 and 7 for the factored and unfactored conditions, respectively.

33. The selected sheetpile sections should be sufficient to withstand installation requirements. Sheetpiles should be installed as recommended in Section 803 of the LSSRB. The sheetpiles should have interlocks to minimize erosion of soils into the sump. Your structural engineer should select a sheetpile section that is sufficient to provide the above mentioned moment capacity. Our recommendations for moment and deflection do not contain factors of safety. Applicable factors of safety should be applied when analyzing the sheetpiles. Should the cofferdam require dewatering or water levels below el -4, the above recommendations should not be considered valid and Eustis Engineering should be contacted to evaluate the proposed system.

Vibrations

34. General. Pile driving and sheetpile installation, as well as other construction activities, have the potential to generate vibrations that may affect nearby structures, pavements, and underground utilities. If vibrations are a concern, Eustis

Engineering recommends vibrations be monitored during the test pile program and during subsequent construction activities of concern. This monitoring should evaluate peak particle velocities during pile driving at critical structures with a seismograph, as well as other construction activities generating vibrations (hauling of fill, moving heavy equipment, etc.). The record of peak particle velocities will provide information in assessing potential damage and the need for changes in construction operations.

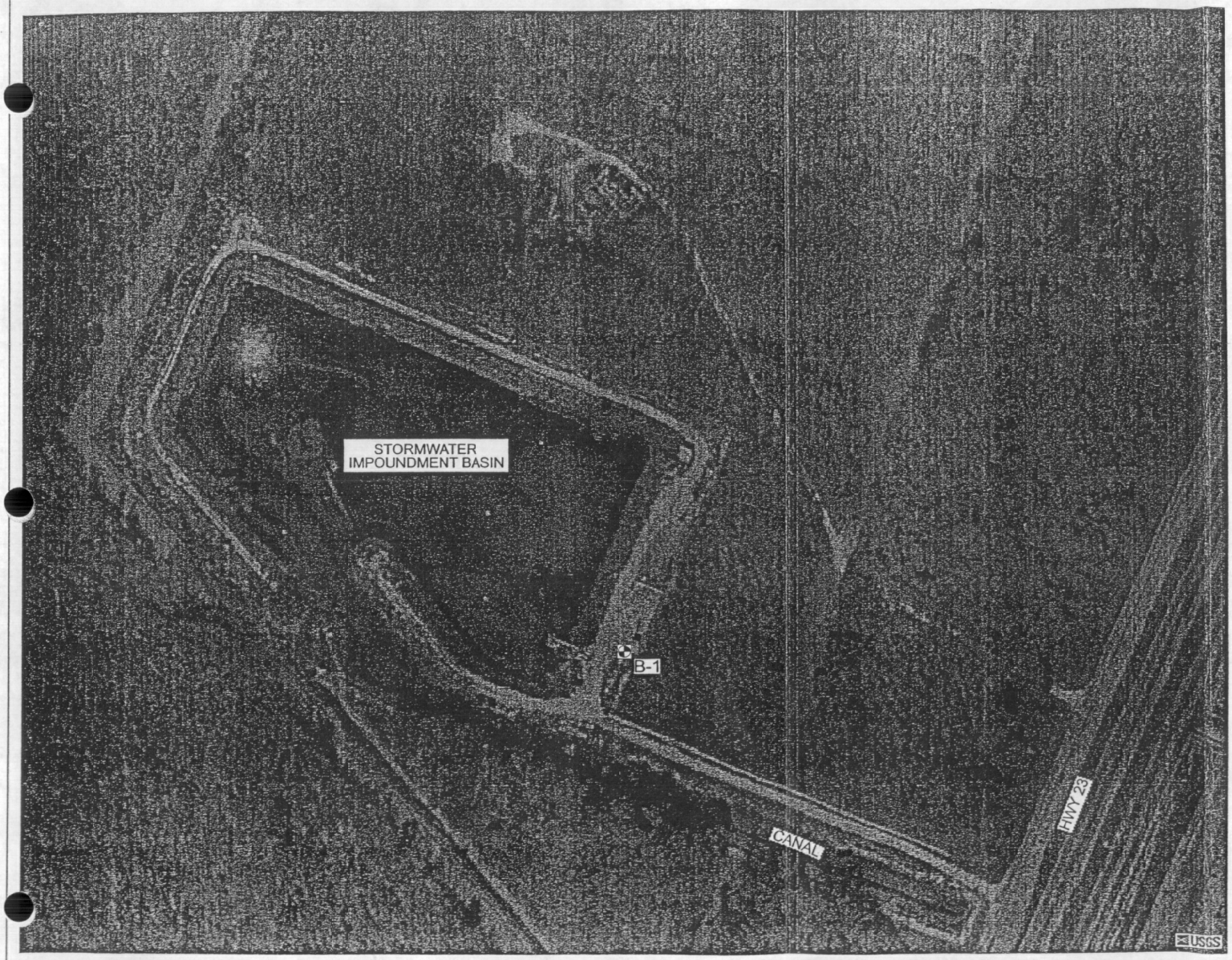
35. Measurement. If vibrations are a concern, we recommend peak particle velocities due to construction operations be monitored at critical structures or pavements with a seismograph during all construction operations that have a potential to cause vibrations. The record of peak particle velocities will provide information in assessing potential damage and the types of changes best suited to the project requirements.

36. Generally, peak particle velocities of 1.5 to 2.0 in./sec are considered to be threshold levels for structural damage. Low peak particle velocity levels can also be a problem for poorly constructed structures that have been previously stressed by settlement or other movements. In such cases, vibrations on the order of 0.5 in./sec can initiate cosmetic damage or further cosmetic damage that has already taken place in the structure. Peak particle velocities between 0.25 and 0.5 in./sec may be sensed as being detrimental by human perception. In addition, peak particle velocities of 0.25 in./sec may densify cohesionless or semi-cohesive deposits (such as fill materials) and result in settlement of structures founded in these materials. Considering the potential for cosmetic damage and the adverse perception to human response, we recommend a level of 0.5 in./sec be set as a construction tolerance for transient construction activities. This level is generally achievable with current construction methods. However, for sustained peak particle velocities in excess of 0.25 in./sec at a pavement, utility, or structure of concern, Eustis Engineering should be notified.

ADDITIONAL GEOTECHNICAL SERVICES

37. To provide continuity between the investigation, design, and construction phases, Eustis Engineering should be retained to provide additional services during completion of the project. These services may include consultation during design and construction, providing inspection of excavations, reviewing design plans and construction sequences proposed by the contractor, logging the installation of job piles, concrete testing and inspection, steel inspection, and any other soils and materials testing services. Eustis Engineering offers a complete range of materials testing services which will provide quality control during construction and conformance to design specifications. Eustis Engineering can also perform DPT during installation and evaluate PDA data with respect to driving stresses, load capacity, and pile integrity.

38. In summary, Eustis Engineering should be retained to monitor all geotechnical related work performed by the contractor. If construction problems arise, Eustis Engineering should be notified to participate in the development of solutions. This participation permits the geotechnical engineer to evaluate the effects of unanticipated conditions and propose solutions on the geotechnical design assumptions particular to the project. The design geotechnical engineer may also be able to judge how site specific soil and ground water conditions will affect the success of a proposed construction alternative.



N

DENOTES UNDISTURBED BORING DRILLED:
23 MAY 2005

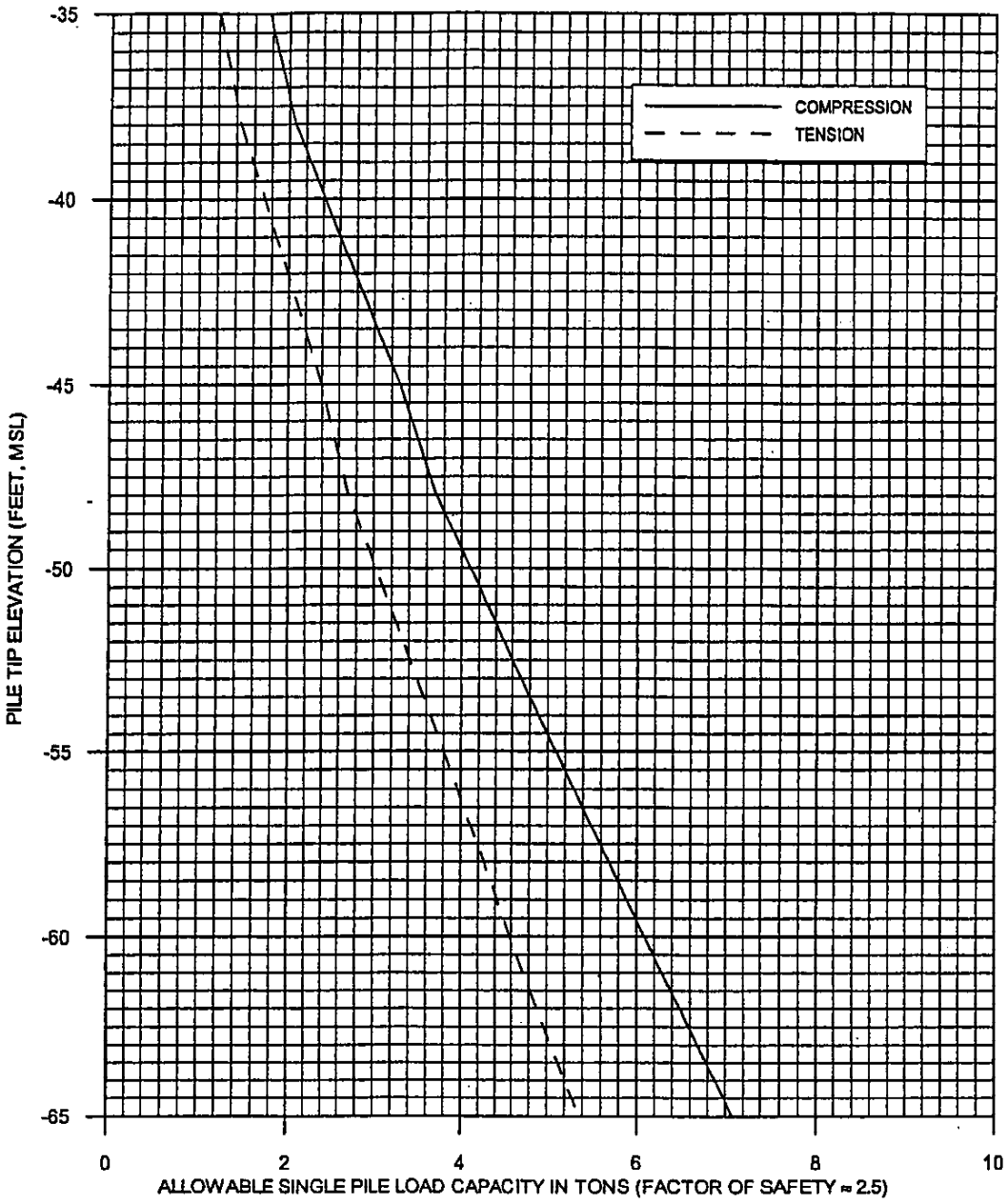
NOT TO SCALE

EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERS
3011 28TH STREET METAIRIE, LOUISIANA

LOCATION OF BORING

CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASE, LOUISIANA

DRAWN BY: D.C.L.	PLOT DATE: 31 MAY 2005	CADD FILE: FIGURE 1.DGN
CHECKED BY: S.P.C.	JOB NO.: 18016	FIGURE 1



NOTES:

(1) PILES ASSUMED TO BE INSTALLED BY VIBRATORY EQUIPMENT.

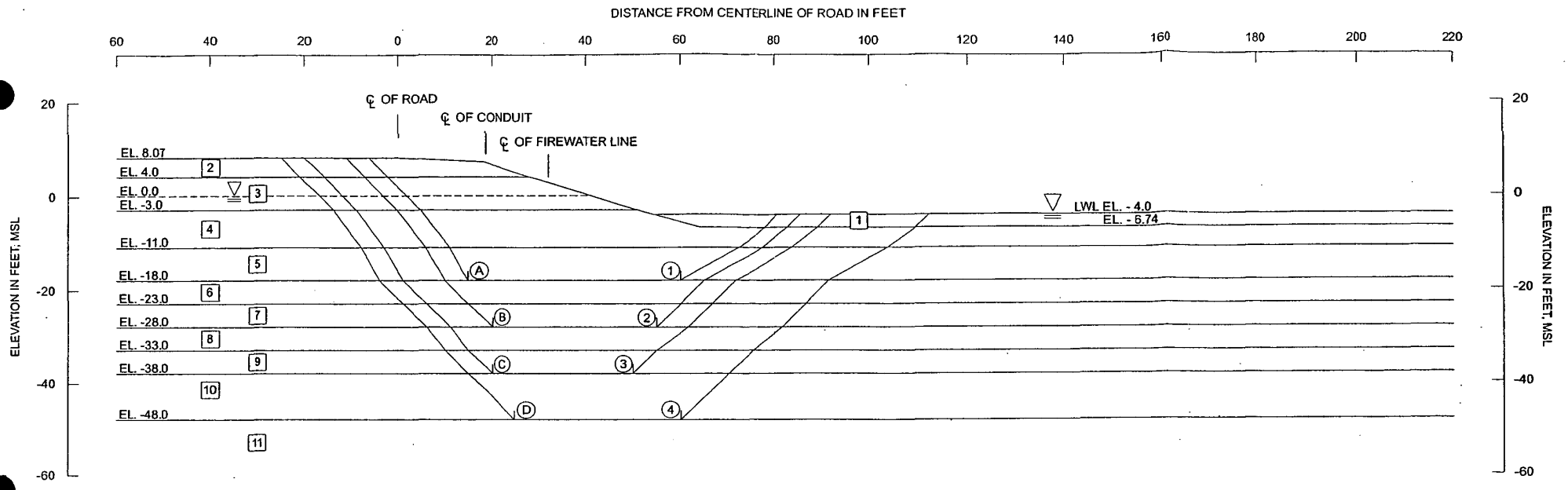
(2) ALLOWABLE PILE LOAD CAPACITIES PRESENTED ON THIS FIGURE DO NOT INCLUDE THE WEIGHT OF THE PILES.

(3) ALLOWABLE PILE LOAD CAPACITIES PRESENTED ON THIS FIGURE NEGLECT THE CAPACITY TO EL -23 (MSL) FOR EMBEDMENT OF THE PILE WITHIN THE CASING AND GROUTING PROCEDURES DESCRIBED IN THE CONSTRUCTION SEQUENCE PROPOSED BY CHEVRON CHEMICAL COMPANY DATED 31 MAY 2005.

EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERS
3011 28TH STREET METAIRIE, LOUISIANA

ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES
8-IN. DIAMETER OPEN END STEEL PIPE PILES
CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASSE, LOUISIANA

DRAWN BY: S.R.S.	2 JUNE 2005	FILE:APLC-VIB.GRF
CHECKED BY: G.P.S.	JOB NO.: 18916	FIGURE 2



SOIL NO.	DESCRIPTION	FRICTION ANGLE IN DEGREES	UNIT WEIGHT IN PCF	COHESION IN PSF	
				AVG.	BASE
1	WATER	0	62.4	0	0
2	CLAY	0	113	650	650
3	CLAY	0	108	745	745
4	SILT	15	119	200	200
5	SAND	30	120	0	0
6	CLAY	0	108	200	200
7	CLAY	0	110	270	270
8	SILT	15	116	200	200
9	CLAY	0	115	350	350
10	CLAY	0	115	500	500
11	CLAY	0	102	580	580

FAILURE SURFACE	SUMMATION OF FORCES IN KIPS/L.F.		FACTOR OF SAFETY
	RESISTING	DRIVING	
Ⓐ ①	47.61	27.78	1.71
Ⓑ ②	57.52	41.7	1.38
Ⓒ ③	79.57	55.7	1.43
Ⓓ ④	106.3	70.84	1.50

NOTES:

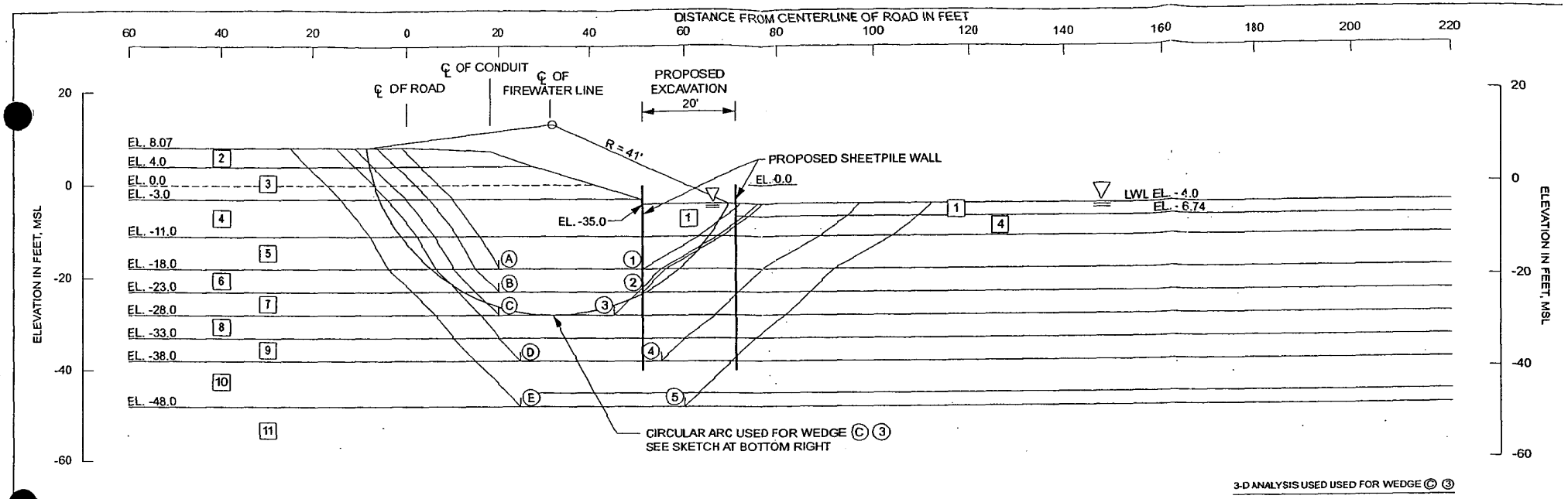
1. SLOPE STABILITY ANALYSES PERFORMED BY LMVD METHOD OF PLANES.
2. FACTOR OF SAFETY COMPUTED AS RATIO OF RESISTING TO DRIVING FORCES.

EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERS
3011 28TH STREET METAIRIE, LOUISIANA

SLOPE STABILITY ANALYSES EXISTING CONDITIONS

CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASSE, LOUISIANA

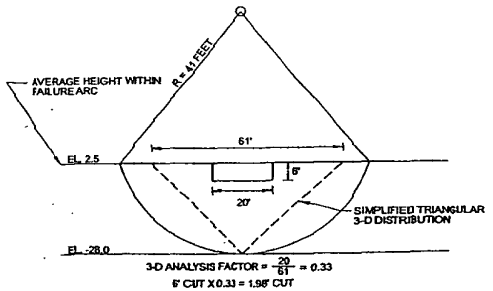
DRAWN BY: D.C.L. | PLOT DATE: 15 JUNE 05 | CADD FILE: FIGURE 3.DGN



3-D ANALYSIS USED USED FOR WEDGE Ⓒ ③

SOIL NO.	DESCRIPTION	FRICTION ANGLE IN DEGREES	UNIT WEIGHT IN PCF	COHESION IN PSF	
				AVG.	BASE
1	WATER	0	62.4	0	0
2	CLAY	0	113	650	650
3	CLAY	0	108	745	745
4	SILT	15	119	200	200
5	SAND	30	120	0	0
6	CLAY	0	108	200	200
7	CLAY	0	110	270	270
8	SILT	15	116	200	200
9	CLAY	0	115	350	350
10	CLAY	0	115	500	500
11	CLAY	0	102	580	580

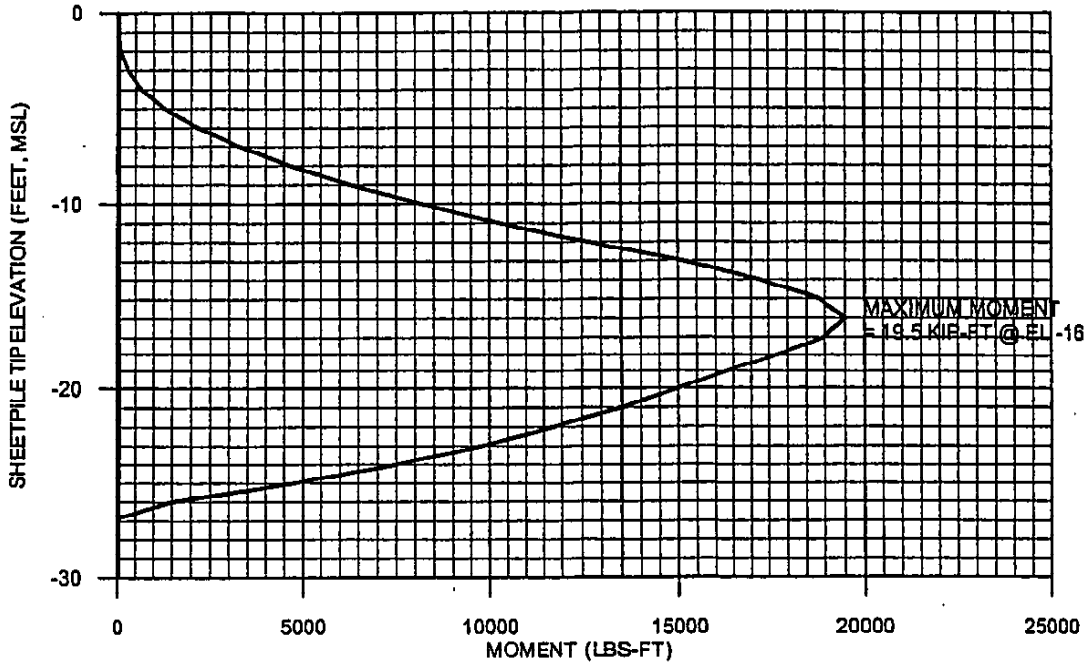
FAILURE SURFACE	SUMMATION OF FORCES IN KIPS/L.F.		FACTOR OF SAFETY	3-D ANALYSIS FACTOR APPLIED TO EXCAVATION DEPTH	FACTOR OF SAFETY USING 3-D ANALYSIS
	RESISTING	DRIVING			
Ⓐ ①	38.27	29.29	1.31	N/A	N/A
Ⓑ ②	43.04	38.03	1.13	0.39	1.37
Ⓒ ③	49.18	43.18	1.14	0.33	1.32
Ⓓ ④	78.26	59.24	1.32	N/A	N/A
Ⓔ ⑤	106.3	73.46	1.45	N/A	N/A



EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERS
3011 28TH STREET METAIRIE, LOUISIANA

SLOPE STABILITY ANALYSES
PROPOSED CUT
CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASSE, LOUISIANA

DRAWN BY: D.C.L. | PLOT DATE: 15 JUNE 05 | CADD FILE: FIGURE 4.DGN



NOTES:

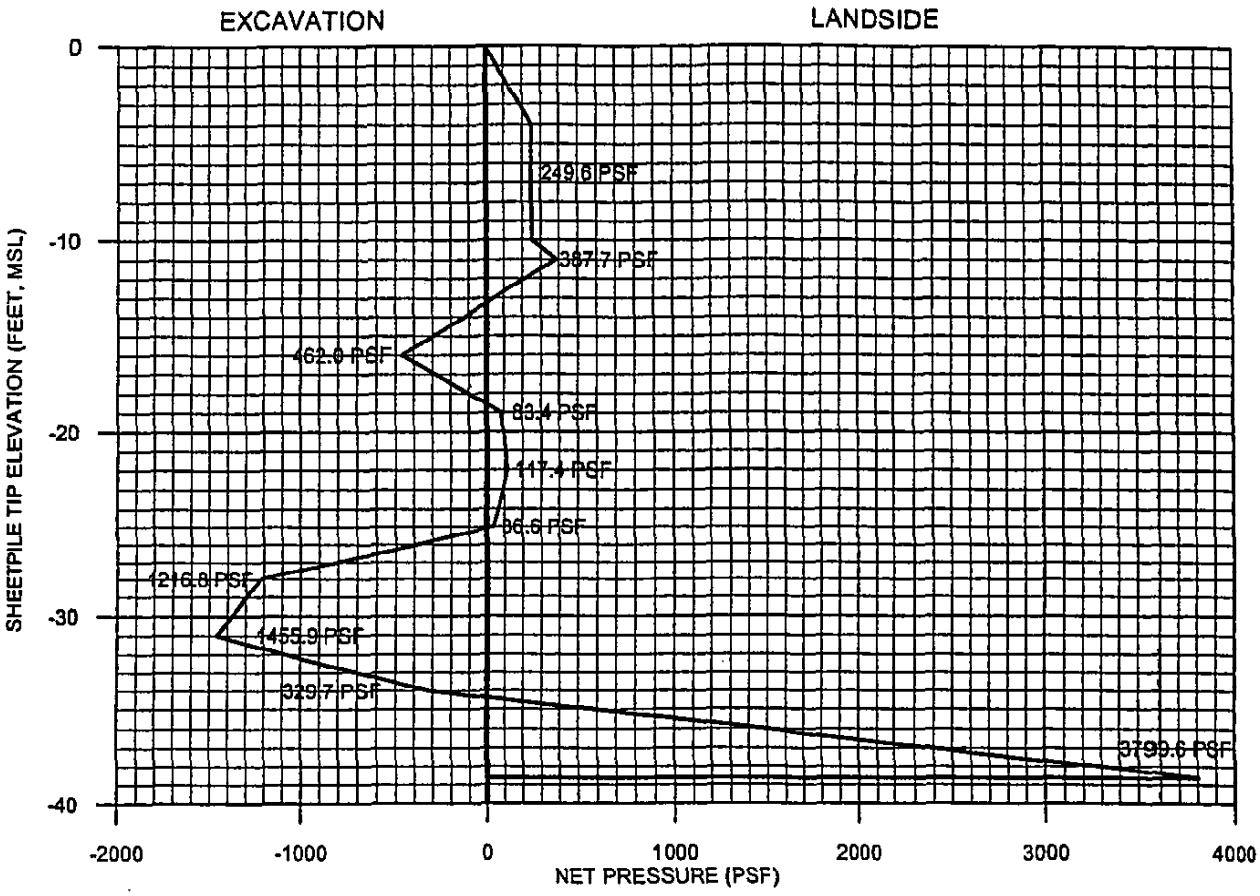
(1) WATER LEVELS ASSUMED TO BE AT EL -4 WITHIN EXCAVATION. BOTTOM OF EXCAVATION AT EL -11.

(2) ASSUMES ADHESION OF THE SOIL TO THE STEEL SHEETPILES EQUAL TO 50 PERCENT OF THE UNDRAINED SHEAR STRENGTHS.

EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERS
3011 28TH STREET METAIRIE, LOUISIANA

MOMENT DIAGRAM (UNFACTORED)
EASTERN COFFERDAM WALL
CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASSE, LOUISIANA

DRAWN BY: S.R.S.	20 JUNE 2005	FILE:FIGURE 5.GRF
CHECKED BY: G.P.S.	JOB NO.: 18916	FIGURE 5



NOTES:

(1) WATER LEVELS ASSUMED TO BE AT EL -4 WITHIN EXCAVATION. BOTTOM OF EXCAVATION AT EL -11.

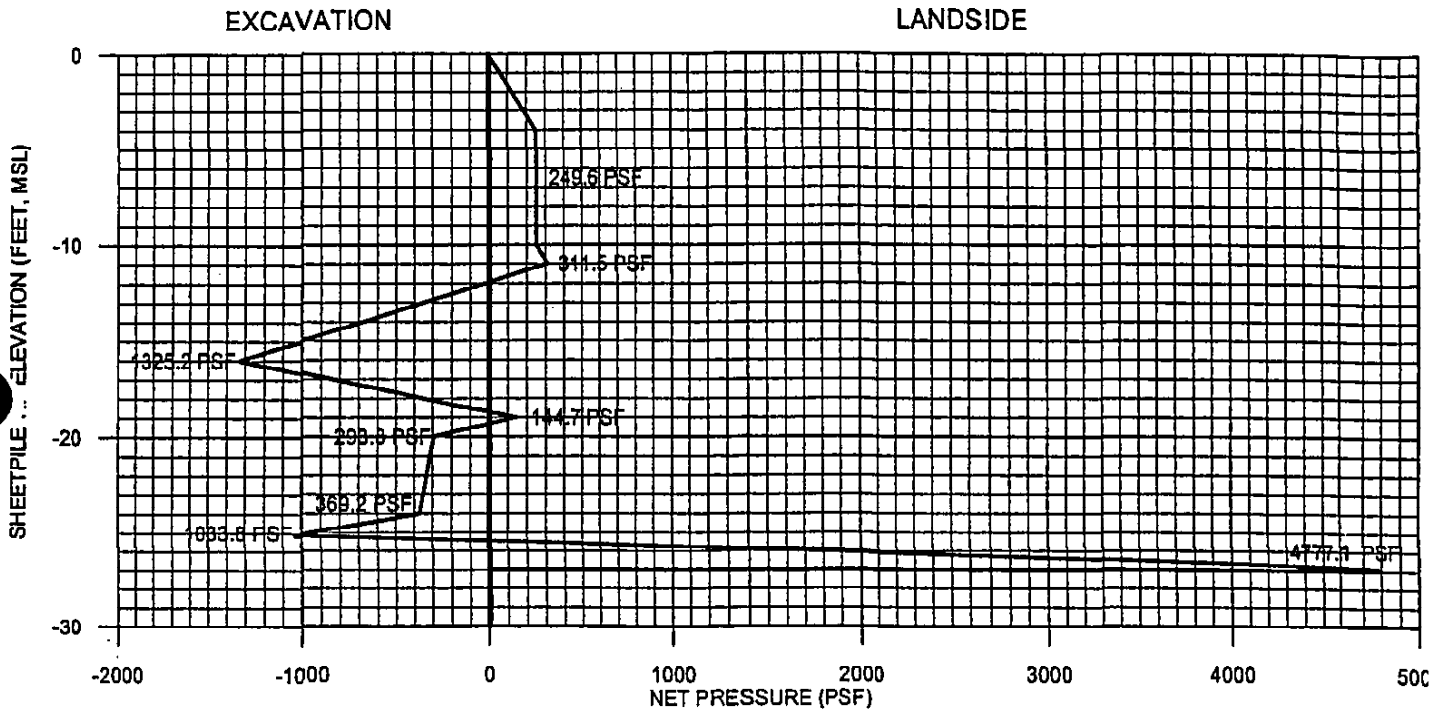
(2) PRESSURES REPRESENT A FACTOR OF SAFETY OF 1.3 APPLIED TO THE SOIL PARAMETERS.

(3) ASSUMES ADHESION OF THE SOIL TO THE STEEL SHEETPILES EQUAL TO 50 PERCENT OF THE UNDRAINED SHEAR STRENGTHS.

EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERS
3011 28TH STREET METAIRIE, LOUISIAN.

NET SOIL PRESSURES (FACTORED)
EASTERN COFFERDAM WALL
CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASSE, LOUISIANA

DRAWN BY: S.R.S.	17 JUNE 2005	FILE:FIGURE 6.GRF
CHECKED BY: G.P.S.	JOB NO.: 18915	FIGURE 6



NOTES:

(1) WATER LEVELS ASSUMED TO BE AT EL -4 WITHIN EXCAVATION. BOTTOM OF EXCAVATION AT EL -11.

(2) ASSUMES ADHESION OF THE SOIL TO THE STEEL SHEETPILES EQUAL TO 50 PERCENT OF THE UNDRAINED SHEAR STRENGTHS.

EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERS
3011 28TH STREET METAIRIE, LOUISIAN

NET SOIL PRESSURES (UNFACTORED)
EASTERN COFFERDAM WALL
CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASSE, LOUISIANA

DRAWN BY: S.R.S.	17 JUNE 2005	FILE:FIGURE 7.GRF
CHECKED BY: G.P.S.	JOB NO.: 18916	FIGURE 7

APPENDIX

LEGEND AND NOTES FOR LOG OF BORING AND TEST RESULTS

PP — Pocket penetrometer resistance in tons per square foot

SPT — Standard Penetration Test: Number of blows of a 140-lb. hammer dropped 30 inches required to drive 2-in. O.D., 1.4-in. I.D. sampler a distance of 1 foot into the soil after first seating it 6 inches

SPLR — Type of Sampling: Shelby, SPT, Auger, No sample

SYMBOL — Clay, Silt, Sand, Peat/Humus, Shells, Stone/Gravel

Predominant type shown heavy; Modifying type shown light

USC — Unified Soil Classification

DENSITY — Unit weight in pounds per cubic foot

SHEAR TESTS

TYPE

- UC Unconfined compression shear
- OB Unconsolidated undrained triaxial compression shear on one specimen confined at the approximate overburden pressure
- UU Unconsolidated undrained triaxial compression shear
- CU Consolidated undrained triaxial compression shear
- DS Direct shear

Ø — Angle of internal friction in degrees

c — Cohesion in pounds per square foot

ATTERBERG LIMITS

LL — Liquid Limit

PL — Plastic Limit

PI — Plasticity Index

OTHER TESTS

- CON Consolidation
- PD Particle size distribution (sieve and/or hydrometer)
- k Coefficient of permeability in centimeters per second
- SP Swelling pressure in pounds per square foot

Other laboratory test results reported on separate figures

GENERAL NOTES

(1) If a ground water depth is shown on the boring log, these observations were made at the time of drilling and were measured below the existing ground surface. These observations are shown on the boring logs. However, ground water levels may vary due to seasonal fluctuations and other factors. If important to construction, the depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

(2) While the individual logs of borings are considered to be representative of subsurface conditions at their respective locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASSE, LOUISIANA

Ground Elev.: 8.0 Datum: MSL Gr. Water Depth: See Text Job No.: 18916 Date Drilled: 5/23/05 Boring: 1 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	SPLR	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0		12			Compact white shells		1	0-0.5											
					Medium dense brown silty sand w/clayey silt layers	SM	2	0.5-1.5											
	3.50					CL	3	2-3	34	84	113	UC	–	630					
	1.90				Medium stiff gray silty clay w/fine sand layers, lenses, & pockets, & roots	CH	4	5-6	47	73	107	UC	–	675					
	1.25				Medium stiff gray & tan clay w/wood fragments & concretions w/silt pockets & wood		5	8-9	43	75	108	UC	–	820					
10					Medium compact gray sandy silt	ML	6	11-12	31	92	120	OB	–	650					
					Medium compact gray clayey silt	ML	7	14-15	33	89	119	OB	–	595					
							8	17-18	34	87	117	OB	–	620					
		25			Medium dense gray silty sand	SM	9	18.5-20	27										
20		23					10	21.5-23											PD
		27					11	24.5-26											
		2			Very soft gray clay w/shell fragments & silt pockets	CH	12	27.5-29	50										
30					Soft gray silty clay w/clay lenses	CL	13	33-34	43	77	110	UC	–	270					
					Loose gray clayey silt w/sandy silt layers	ML	14	38-39	32	88	116	OB	–	430					
40					Very soft gray silty clay w/clayey silt lenses & wood	CL	15	43.5-45	48										
					Medium stiff gray silty clay w/silty sand lenses	CL													
50							16	49-50	31	88	115	UC	–	500					

Comments:

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

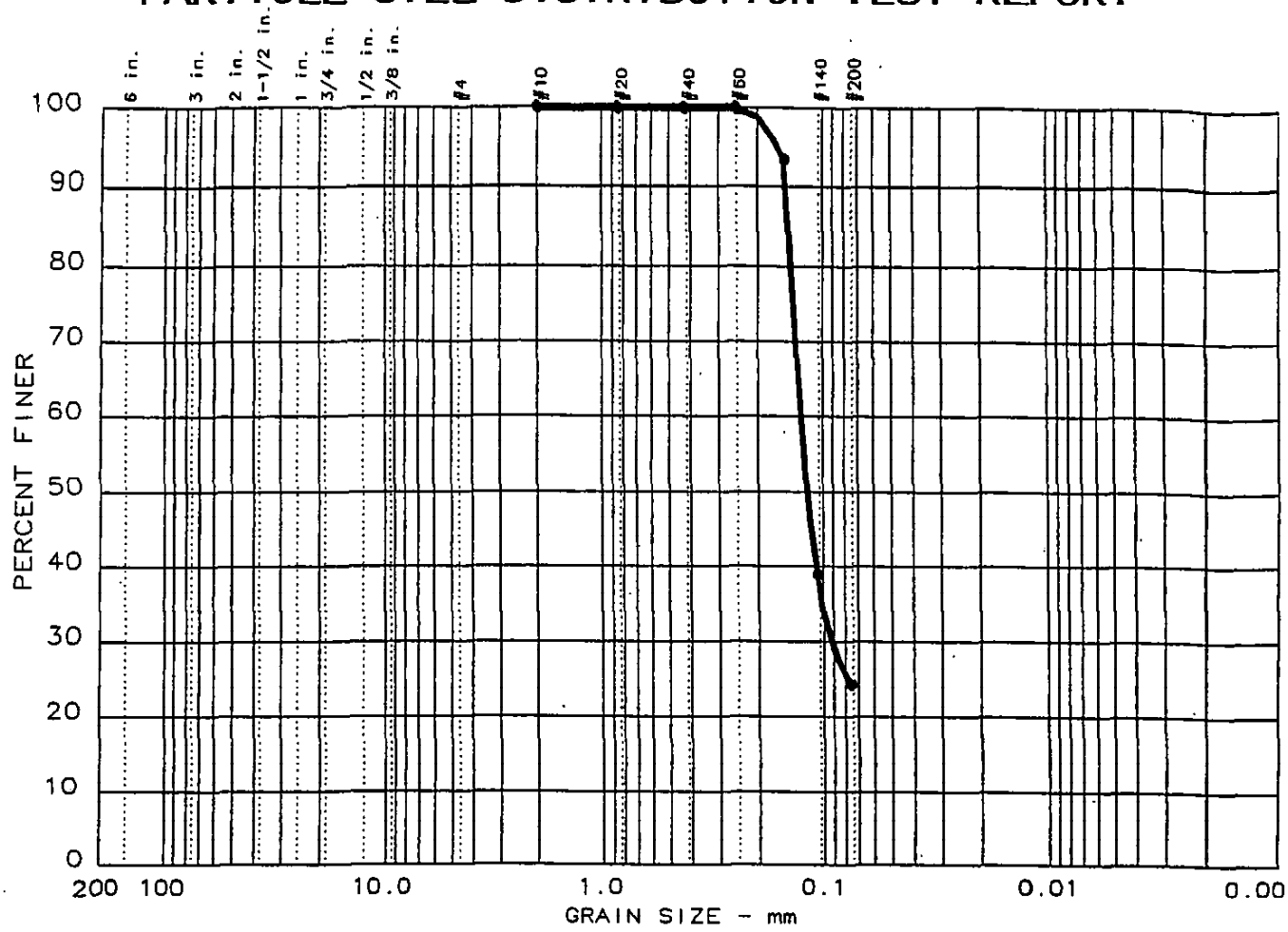
CHEVRON CHEMICAL COMPANY
OAK POINT PLANT
STORMWATER PUMPING STATION
BELLE CHASSE, LOUISIANA

Ground Elev.: 8.0 Datum: MSL Gr. Water Depth: See Text Job No.: 18916 Date Drilled: 5/23/05 Boring: 1 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50					Medium stiff gray silty clay w/silty sand lenses	CL													
	0.25				Soft gray silty clay w/silty sand lenses & clayey silt lenses	CL	17	53-54	37										
					Medium stiff gray clay w/silt pockets	CH													
	0.25						18	58-59	56	65	101	UC	—	525					
60																			
	0.50						19	63-64											
	0.25				Medium stiff gray clay		20	69-70	49	69	103	UC	—	640					
70																			
	0.25						21	74-75											
80																			
90																			
100																			

Comments:

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	13	0.0	0.0	75.8	24.2		SM		

SIEVE inches size	PERCENT FINER ●
GRAIN SIZE	
D_{60}	0.13
D_{30}	0.09
D_{10}	
COEFFICIENTS	
C_c	
C_u	

SIEVE number size	PERCENT FINER ●
10	100.0
20	100.0
40	100.0
60	100.0
100	93.3
140	38.9
200	24.2

Sample information:
● Boring 1, Sample 10
Gray Silty Sand

Remarks:
Sample Depth 23.0'

Eustis Engineering Company, Inc.

Project No.: 18916
Project: Chevron Chemical Co. - Oak Point Plant

Date: 5-30-05 Data Sheet No. ——

Geraghty & Miller, Inc.

LITHOLOGIC LOG OF MONITOR WELL MW-11

Description	Depth (ft)	Thickness (ft)
Fill material - shell.....	0 - 1.5	1.5
Clay, silty, soft to very soft, gray with black stains; shell fragments.....	1.5 - 6	4.5
Clay, silty, soft, gray; organics.....	6 - 9	3
Clay, sandy, soft, gray.....	9 - 10.5	1.5
Sand, silty, very loose, gray.....	10.5 - 12	1.5
Clay, silty, soft to very soft, gray; sand lenses.....	12 - 16.5	4.5
Clay, silty, very soft, gray; shell fragments.....	16.5 - 18	1.5
Clay, silty, very soft, gray; sand lenses; shell fragments.....	18 - 23.5	5.5
Silt, sandy, soft, gray.....	23.5 - 24	.5
Sand, silty, loose to firm, gray.....	24 - 28.5	4.5
Sand, clayey, loose, gray.....	28.5 - 30	1.5

Geraghty & Miller, Inc.

LITHOLOGIC LOG OF MONITOR WELL MW-12

Description	Depth (ft)	Thickness (ft)
Fill material - shell and rocks.....	0 - 3	3
Clay, silty, soft to very soft, gray.....	3 - 9	6
Clay, silty, very soft, gray.....	9 - 13.5	4.5
Clay, sandy, soft to very soft, gray.....	13.5 - 16.5	3
Clay, silty, very soft, gray; shell fragments; trace of sand.....	16.5 - 22.5	6
Clay, sandy, soft, gray.....	22.5 - 24	1.5
Sand, silty, loose, gray.....	24 - 27	3
Sand, clayey, loose to very loose, gray; organics.....	27 - 28.5	1.5
Clay, sandy, soft, gray; organics.....	28.5 - 30	1.5

LITHOLOGIC LOG OF MONITOR WELL MW-19

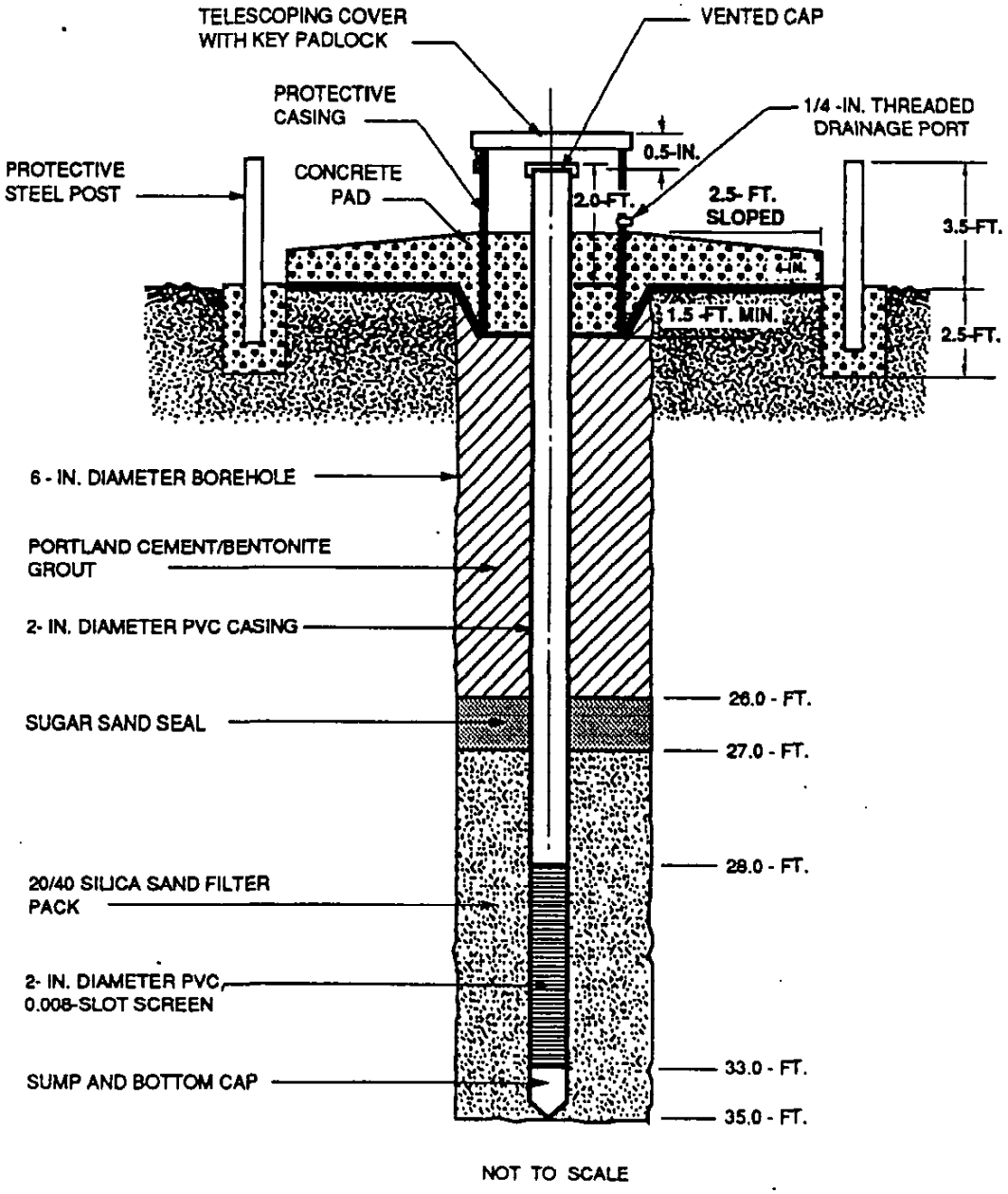
Description	Depth (ft)	Thickness (ft)
No split spoon sample taken due to possible underground pipes - material was fill - shells and clay.....	0 - 3	3
Clay, silty, soft to firm, gray; organics.	3 - 6	3
Clay, silty, soft, brown and gray; sand stringers.....	6 - 9	3
Clay, silty, very soft, gray with black streaks.....	9 - 10.5	1.5
Clay, silty, soft, gray.....	10.5 - 12.5	2
Clay, silty, soft to very soft, gray; sand lenses.....	12.5 - 18.5	6
Clay, silty, very soft, gray; shell fragments.....	18.5 - 26	7.5
Clay, silty, very soft, gray; sand lenses.	26 - 27.5	1.5
Silt, sandy, soft, gray.....	27.5 - 29	1.5
Sand, silty, loose, gray.....	29 - 32	3
Sand, silty, loose, gray with black streaks.....	32 - 33.5	1.5
Sand, silty, loose, gray with black streaks; trace of clay.....	33.5 - 35	1.5

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-19

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



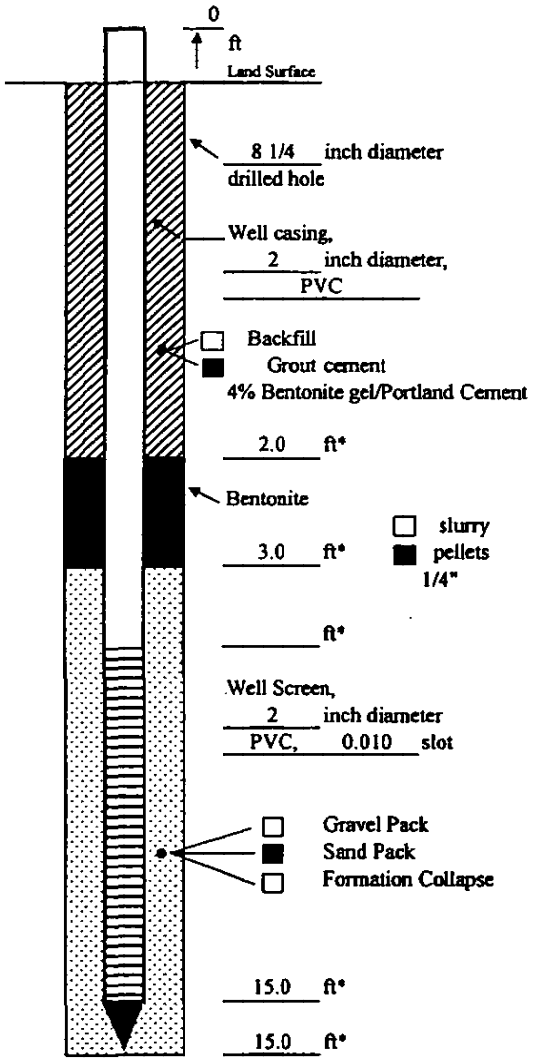
NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-19

ARCADIS
GERAGHTY & MILLER

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.
* Depth Below Land Surface

Project	Chevron Chemical Co./LA001974.0001	Well	LMS-1R
Town/City	Belle Chasse		
County/Parish	Plaquemines Parish	State	Louisiana
Permit Number	NA		
Land-Surface Elevation and Datum NGVD	4 feet	☐ Surveyed ■ Estimated	
Installation Date(s)	6/23/2000		
Drilling Method	hollow stem auger		
Drilling Contractor	Fugro		
Drilling Fluid	None		

Development Technique(s) and Date(s)
hand bail (6-23-00)

Fluid Loss During Drilling	NA	gallons
Water Removed During Development	15	gallons
Static Depth to Water	3	feet below M.P.
Pumping Depth to Water	NA	feet below M.P.
Pumping Duration	NA hours	
Yield	NA gpm	Date
Specific Capacity	NA	gpm/ft
Well Purpose	replacement of monitoring well for damaged Well MS-1	

Remarks: flush mount well; grout slurry measured 13.9 lbs/gallon before and after placement.

Prepared by: K. Montgomery

ARCADIS Geraghty & Miller, Inc.

SAMPLE/CORE LOG

Boring/Well LMS-1R Project/No. CHEVRON CHEMICAL COMPANY (LA001974.0001) Page 1 of 1

Site Location Belle Chasse, Louisiana Drilling Started 06/23/00 0725 Drilling Completed 06/23/00 0830

Land-Surface Elev. 4 feet ☐ Surveyed ☒ Estimated Datum NGVD

Drilling Fluid None Drilling Method Used Hollow Stem

Drilling Contractor Fugro Driller David Helper N/A

Prepared By K. Montgomery Hammer Weight N/A Hammer Drop N/A inches

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, ▽ Water First Encountered

Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVA (ppm)	REMARKS
0								
1				Not sampled, 0-10 ft bls				
2								
3								
4								
5								
6								
7								
8								
9								
10								
11		2.0		Clayey silt (30 %), gray, sand partings, wet				
12								
13		3.0		- (20 %), gray, less clay, sandy (10 %), gray				
14								
15				Total Depth - 15 ft bls				
16								

ARCADIS G & M, Inc.
2900 West Fork Dr., Suite 540
Baton Rouge, LA 70827

SAMPLE / CORE LOG

Boring/Well: LMS-2R Project No.: Chevron Oak Point/LA002414.0001.00001 Page 1 of 1

Site Location: Belle Chasse, LA; West Ditch and Hwy 23 Drilling Started: 3/15/04 0800 Drilling Completed: 3/15/04 0910

Land-Surface Elev.: NA Surveyed: NA Estimated: NA Datum: NA

Drilling Fluid: None Drilling Method Used: Hollow Stem

Drilling Contractor: Pro Tech Driller: Ronnie Ducote Helper: Kevin Frazier

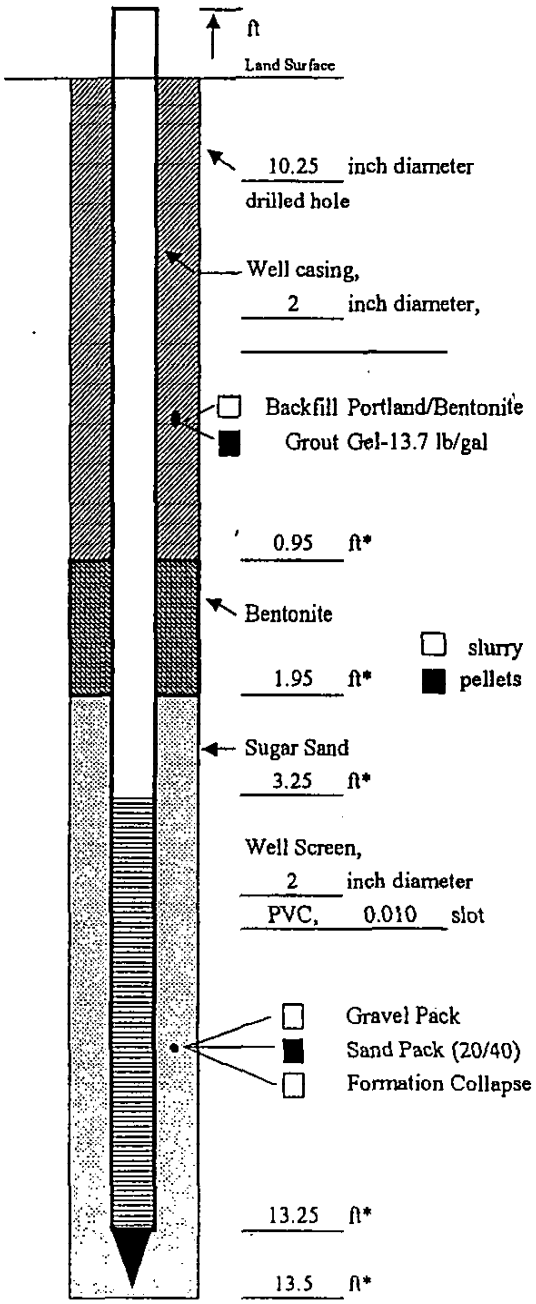
Prepared By: J. Wilson Hammer Weight: NA Hammer Drop (inches): NA

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Acetate Sleeve | Water First Encountered
Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H	PP V	OVA (wo/F) (ppm)	OVA (w/F) (ppm)	REMARKS
0-2		2.0		CLAY: fill, road bed of shells and gravel		0.75	0.75	NA		
2-4				SILTY CLAY: gray, dark gray, plant root material, some natural organics, red ferrous staining, soft, damp		0.50	0.50			
4-6		4.0		- gray, increase in silt content, very soft, wet		0.50	0.50	NA		▽
6-8				- increase in plant root material and black natural organics, soft, very damp		0.25	0.25			
8-10		4.0		- larger woody root fragments, stiffer, damp		0.50	075			
10-12				SILTY SAND: gray, soft, wet		0.50	0.50	NA		
12-13		3.5		SILTY CLAY: gray, very soft, wet		0.25	0.50	NA		
13-14				TOTAL DEPTH - 13.5 ft bls @ 0910						

ARCADIS

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project	Chevron/LA002414.0001.00001	Well	LMS-2R
Town/City	Belle Chasse		
County/Parish	Plaquemines	State	Louisiana
Permit Number	NA		
Land-Surface Elevation and Datum	NA feet	☐ Surveyed ☐ Estimated	
Installation Date(s)	3-15-04		
Drilling Method	Hollow Stem		
Drilling Contractor	Pro Tech		
Drilling Fluid	None		

Development Technique(s) and Date(s)

Hand Bailed 3-17-04

Fluid Loss During Drilling	NA	gallons
Water Removed During Development	45	gallons
Static Depth to Water	NA	feet below M.P.
Pumping Depth to Water	NA	feet below M.P.
Pumping Duration	NA	hours
Yield	NA gpm	Date NA
Specific Capacity	NA	gpm/ft
Well Purpose	Groundwater Monitoring Well	

Remarks: Replacemnt well for destroyed LMS-2

Prepared by: Jacob Wilson

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well LMS-3 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location Belle Chasse, Louisiana Drilling Started 05-26-92 10:50 Drilling Completed 05-26-92 11:30

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Eric

Prepared By Trey Harrel Hammer Weight NA Hammer Drop NA Inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (HW)	OVM (ppm)	REMARKS
0								
1	Not Sampled			Fill, shells, small rocks, silty sand, brown.				
2		0.0						
3								
4		1.0					0.6	
5				Clay, gray, stiff, some roots and shells, dry.				
6							1.2	
7		2.0		- abundant roots and wood fragments, clay turns to greey/gray.				
8								
9		2.0		- silting downward, damp.			1.2	
10				Silty clay, moist.				▽
11				Silt, gray, wet.				
12		3.0					0.8	
13				Silty clay, gray, soft and sticky, wet.				
				Total Depth - 13.5 ft bls				

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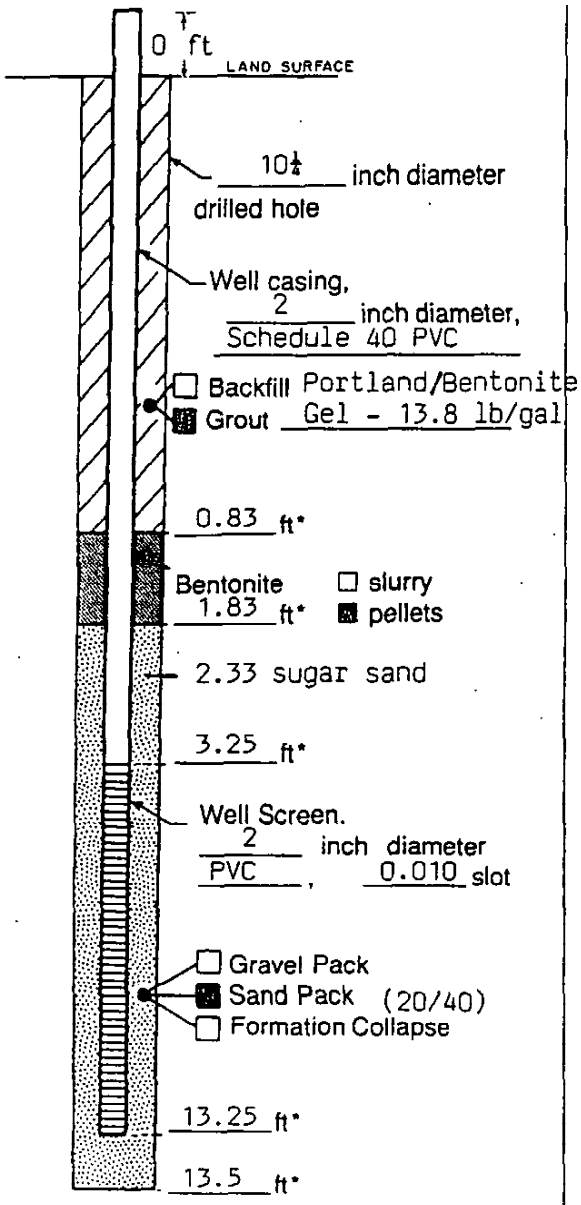
WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA554.01 Well LMS-3
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) 05-26-92
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed 06-03-92

Fluid Loss During Drilling NA gallc
Water Removed During Development 10 gallc
Static Depth to Water NA feet below M
Pumping Depth to Water NA feet below M
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Ground-water monitoring well

Remarks

Prepared by T. Harrel

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well LMS-4 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location Belle Chasse, Louisiana Drilling Started 05-22-92 8:00 Drilling Completed 05-22-92 9:00

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Eric

Prepared By Trey Harrel Hammer Weight NA Hammer Drop NA Inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0								
1		2.5		Clay, brown, very stiff, some roots and ferrous nodules, dry.			1.8	
2				- silt lenses.				
3				Silty clay, brown, soft and pliable, ferrous nodules and roots, damp.			2.5	Retained for analysis
4		1.5						
5								
6							1.2	
7		2.5		Clay, gray/brown, stiff and sticky, some roots and ferrous nodules, wood fragments.				
8							1.8	
9		2.5		Silty clay, moist.				▽
10				Silt, gray, wet.				
11							1.2	
12		3.5					0.8	
13				Clay, gray, stiff, sticky, dry.				
				Total Depth - 13.5 ft bls				

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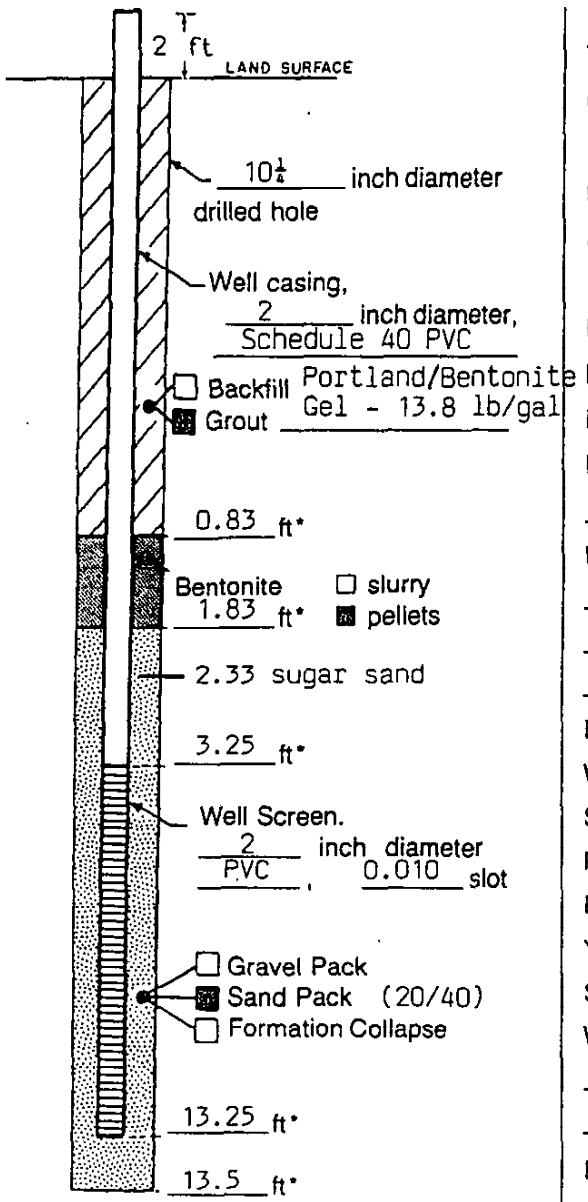
WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA554.01 Well LMS-4
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) 05-22-92
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed 06-02-92

Fluid Loss During Drilling NA gallo
Water Removed During Development 7.5 gallo
Static Depth to Water NA feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Ground-water monitoring well

Remarks

Prepared by T. Harrel

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well LMS-5R Project/No. Chevron Chemical Company (LA1344.001) Page 1 of 5

Site Location Belle Chasse, Louisiana Drilling Started 05/07/96 0850 Drilling Completed 05/07/96 0930

Land-Surface Elev. NA feet ☐ Surveyed ☐ Estimated Datum NA

Drilling Fluid Used NA Drilling Method Hollow Stem Auger

Drilling Contractor Fugro Driller Robert Legete Helper Mackie

Prepared By R. John Ellis Hammer Weight NA Hammer Drop NA Inches

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, ▽ Water First Encountered

Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0–2			Fill	Fill, shells and rocks				
2–3		1.5	Clay	Clay, dark gray, moist, minor amounts of silt, firms, rootlets		2.0/1.75		
4–5		1.5	Silty Clay	Silty clay, dark gray, very moist, soft, minor iron oxide staining - intervals of very silty clay		0.25/0		
6–7		2.0	Silty Clay / Silt	- dark gray to gray, soft, heavy iron oxide staining - silt layer (4" thick) at 7 feet, wet, faint horizontal bedding		0.5/0.5		▽
8–9		2.0	Silty Clay	- becoming less silty, heavy iron oxide staining/nodules		0.5/0.5		
10–11		1.5	Clay	Clay, dark gray, very moist to wet, minor amount of silt, large roots/rootlets, occasional layer of silty clay, minor fractures		0.5/0.25		
12–13		1.5	Clay			0.75/0.5		
14			Clay	- roots/rootlets				
15				Total Depth - 14.5 ft bls				
50								

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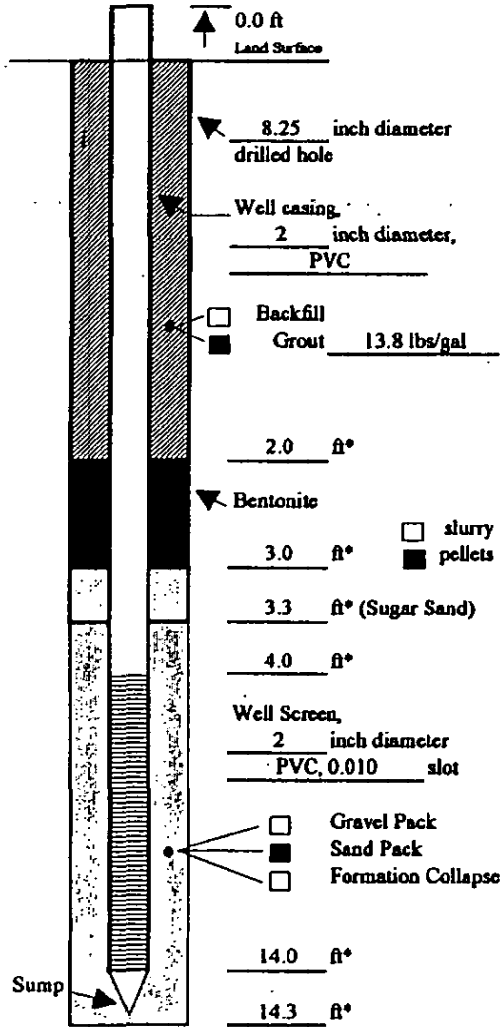
Environmental Services
a heidemij company

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

Project	Chevron Chemical (LA1344.001)	Well	LMS-5R
Town/City	Belle Chasse		
County	Plaquemines	State	LA
Permit Number	NA		
Land-Surface Elevation and Datum	6.65 feet NGVD29	■ Surveyed □ Estimated	
Installation Date(s)	May 7, 1996		
Drilling Method	Hollow Stem Auger		
Drilling Contractor	Fugro Geoscience, Inc.		
Drilling Fluid	None		

Development Technique(s) and Date(s)
Hand bailed (5/8/96)

Fluid Loss During Drilling	None		gallons
Water Removed During Development	35		gallons
Static Depth to Water	3.11		feet below M.P.
Pumping Depth to Water	NA		feet below M.P.
Pumping Duration	NA	hours	
Yield	NA gpm	Date	NA
Specific Capacity	NA	gpm/ft	
Well Purpose	Groundwater Monitoring Well - Replacing LMS-5		

Remarks: Sand: 11 ft x 34 lbs/ft = 374 lbs; pellets: 1 ft x 26 lbs/ft = 26 lbs; grout: 4.25 gallons of water x 47 lbs of Portland x 2.4 lbs of bentonite = 13.8 lbs/gal

Prepared by: R. John Ellis

* Depth Below Land Surface

CHEVRON\SAMPLING\WC-LMS5R.XLS\table

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well LM3-6 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location Belle Chasse, Louisiana (New Landfill) Drilling Started 05-22-92 11:00 Drilling Completed 05-22-92 11:50

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Eric

Prepared By Trey Harrel Hammer Weight NA Hammer Drop NA inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (HV)	OVM (ppm)	REMARKS
0								
1	Not Sampled			Overburden (fill).				
2								
3								
4								
5								
6		1.5		Clay, brown, stiff and hard, some wood and shell fragments, ferrous nodules, dry.			3.1	Retained from analysis
7								
8								
9		1.5		- ferrous staining.			1.2	
10								
11		2.5		Clayey silt (30/70), alternating brown/gray/orange seams, wet.	-		1.2	▽
12								
13				Clay, brown, stiff, dry.			0.6	
14		2.5						
15				Silt, gray, wet.				
16							0.0	
17				- wood fragments.				
18				Clay, gray, stiff and sticky, dry.				
19				Total Depth - 18.5 ft bls				

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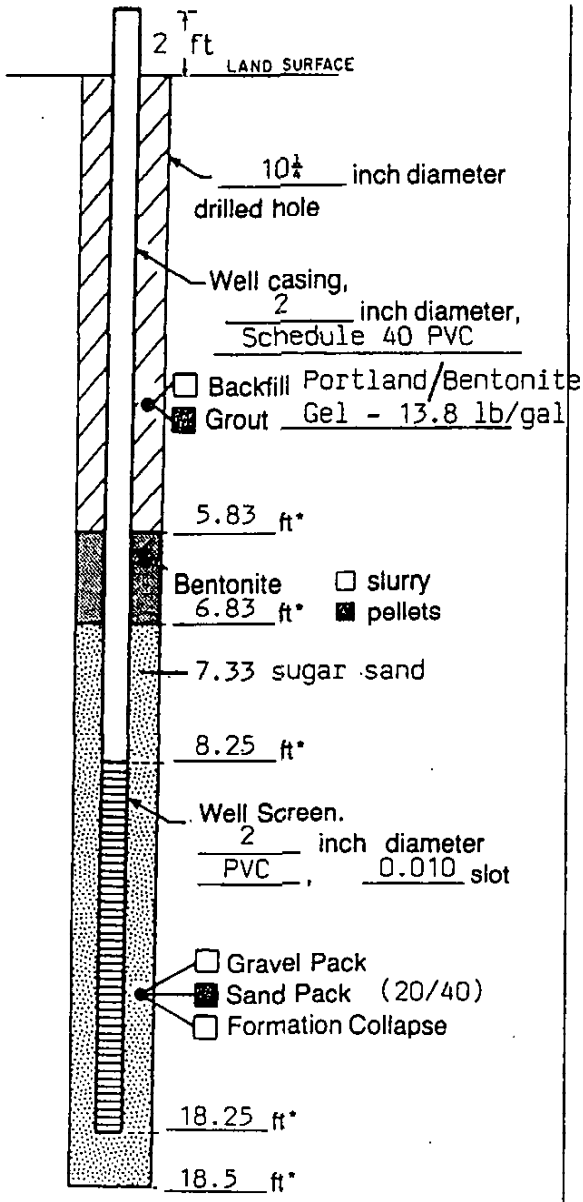
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical - LA554.01 Well LMS-6
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed ☐ Estimated
Installation Date(s) 05-22-92
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed 06-02-92

Fluid Loss During Drilling NA gallo
Water Removed During Development 9.5 gallo
Static Depth to Water NA feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Ground-water monitoring well

Remarks

Prepared by T. Harrel

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LO_

Boring/Well LMS-7 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location Parish Property (Animal Shelter) Drilling Started 05-20-92 7:35 Drilling Completed 05-20-92 9:00

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Eric

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (HV)	OVM (ppm)	REMARKS
0								
				Grass, shells, fill.				
1		0.0		Silty clay, very hard, some rocks (small), dry, dark brown.			0.0	
2		1.5		- silty (40%), ferrous concretions, softer.				
3				- moist, ferrous concretions, dark brown.				
				- sandy, (trace) silt (30%), gray to brown.				
4				- silty (30%), moist, gray to brown, soft, friable.			0.0	
5		2.5		- silt-sand-clay lenses (alternating), gray and brown, wet.				▽
6								
7				Clay, natural organics, gray, moist, soft, ferrous stain and concretions.			0.0	
		2.5						
8				Silty clay (40%), wet clay, tan to gray, ferrous discoloration.				
9				- gray, soft, gray sandy silt pockets throughout.				
10		2.5						
11				Sandy silt (30%), clayey (trace), wet, gray.				
12				- rootlets.				
13		1.5						
				Total Depth - 13.5 ft bls				

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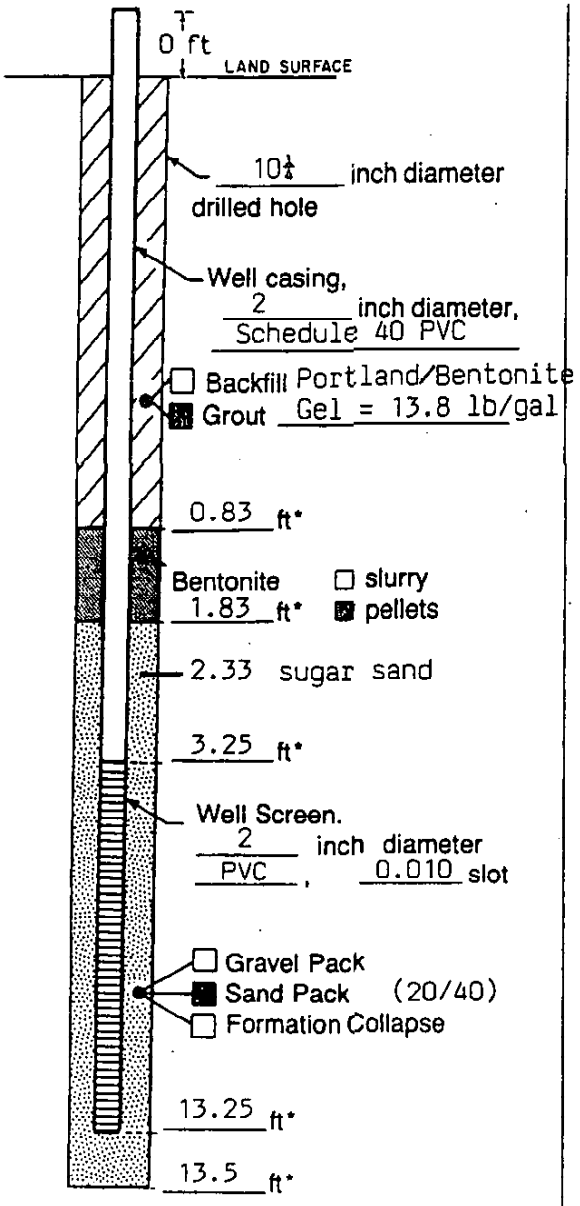
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA554.01 Well LMS-7

Town/City Belle Chasse

County Plaquemine State LA

Permit No. NA

Land-Surface Elevation and Datum NA feet ☐ Surveyed ☐ Estimated

Installation Date(s) 05-20-92

Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering

Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed - 06-03-92

Fluid Loss During Drilling NA gallo

Water Removed During Development 6 gallo

Static Depth to Water NA feet below M.

Pumping Depth to Water NA feet below M.

Pumping Duration NA hours

Yield NA gpm Date NA

Specific Capacity NA gpm/ft

Well Purpose Ground-water monitoring well

Remarks

Prepared by Kipper Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well LMS-8 Project/No. CHEVRON (LA.554.01) Page 1 of 1

Site Location Parish Sewage Treatment Plant Drilling Started 05-21-92 11:15 Drilling Completed 05-21-92 12:10

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Erlo

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA Inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

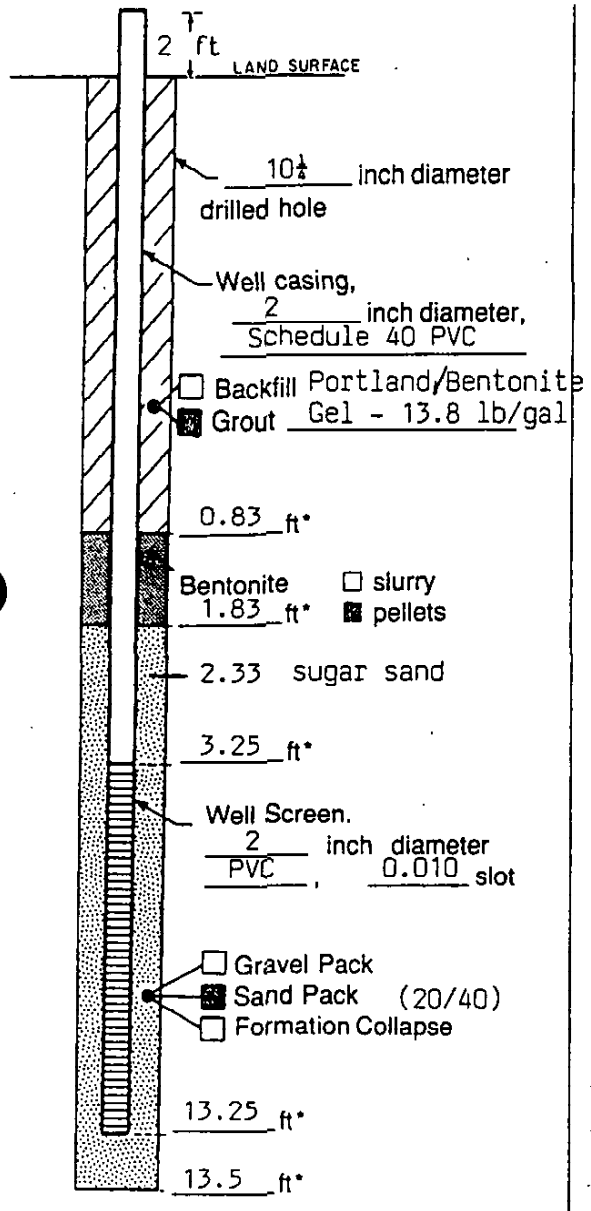
Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0								
1				Grass, silt, shells (fill).				
2		2.5		Clay, very stiff to hard, dark brown, shells, dry. - silty, brown, soft, rootlets.				
3				Silty sand, very fine (30%), brown, moist.				
4								▽
5		2.5		Silty clay, (20%), stiff, brown.			0.0	
6				- high in natural organics (ferrous staining), fractured, gray, wet.				
7		2.5						
8				- brown, continued wet to moist, (30%) silt.			0.0	
9				- wood fragments and roots, brown.				
10		2.5						
11				- gray, roots continue, wet.				
12								
13		3.5						
				Total Depth - 13.5 ft bls				

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG

(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA554.01 Well LMS-8

Town/City Belle Chasse

County Plaquemine State LA

Permit No. NA

Land-Surface Elevation

and Datum NA feet ☐ Surveyed

☐ Estimated

Installation Date(s) 05-21-92

Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering

Drilling Fluid None

Development Technique(s) and Date(s)

Hand bailed 06-03-92

Fluid Loss During Drilling NA gallon

Water Removed During Development 15 gallon

Static Depth to Water NA feet below M.P

Pumping Depth to Water NA feet below M.P

Pumping Duration NA hours

Yield NA gpm Date NA

Specific Capacity NA gpm/ft

Well Purpose Ground-water monitoring well

Remarks

Prepared by Kipper Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/COR_ LOG

Boring/Well LMS-9 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location 175' W of NW Corner of Landfill C (Hero Parish Property) Drilling Started 05-28-92 12:30 Drilling Completed 05-28-92 13:45

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Eric

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, ▽ Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (HW)	OVM (ppm)	REMARKS
0								
1				Fill, clay.				
2						4+	0.0	
3		2.0		Silty clay, gray to brown, hard, shells, rootlets.				
4				- silty (20%), dry, hard, some shells.		4+	0.0	
5		2.0		- hard, dark brown, ferrous natural organics throughout.				
6							0.0	Sample retained for analyses
7				- silty (25%), light brown.				▽
8		2.5		- silty (40%), moist, loose.				
9				- silt seam, very moist.				
10		2.5		- silt (30%), moist, gray.		1.0/1.0		
11				- high in natural organics, brown to gray, wet.				
12				- gray, less brown, soft.				
13		2.0		- very soft, wet.		<0.25/<0.25		
14				-abundant wood.				
15		2.0		- silty (40%), gray, wet, "sticky", wood continued.				
16								
17				Sandy silt (40%), very fine, gray, wet.				
		2.5		Total Depth - 17.5 ft bls				

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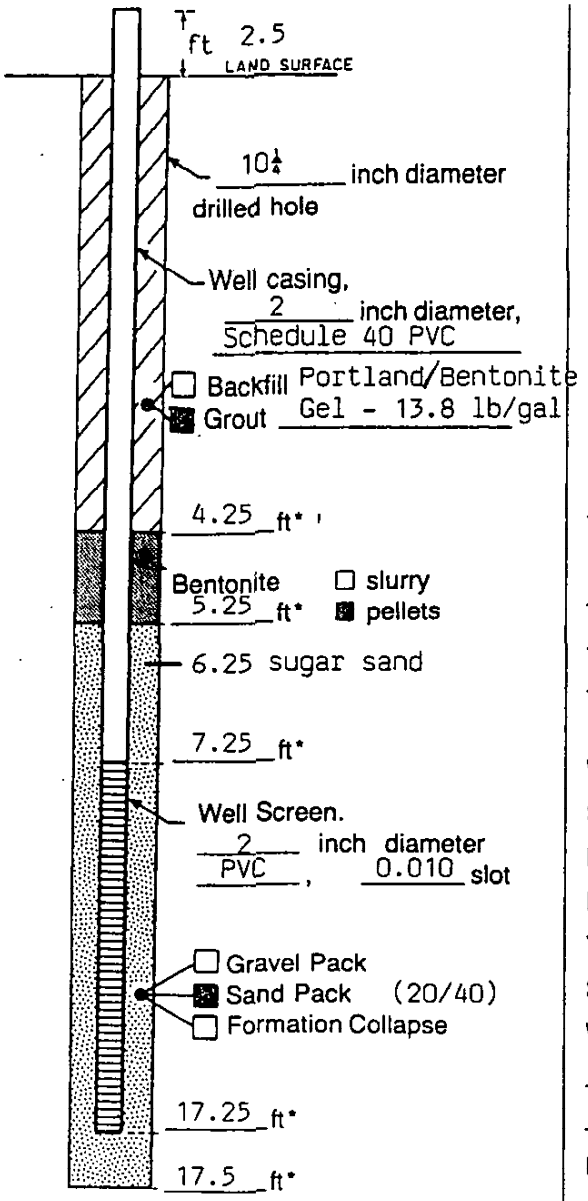
WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical - LA554.01 Well LMS-9
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) 05-28-92
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed 06-02-92

Fluid Loss During Drilling NA gallo
Water Removed During Development 6.5 gallo
Static Depth to Water NA feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Ground-water monitoring well

Remarks

Prepared by Kipper Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well LMS-10 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location West of Landfill C (15') Drilling Started 05-27-92 14:00 Drilling Completed 05-27-92 15:00

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Erle

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0								
1				Clay, hard, dark brown.		4.0/4.0	0	
2		2.5		- silt break, brown, loose.				
3				Silt, brown, loose, dry layer (6").				
4				Silty clay (30%), brown to gray, natural organics, ferrous concretions, very fine.		3.0/2.5	1.2	
5		2.0		Sandy silt (13%), dry, not consolidated, brown.				
6				Clay, moist, natural organics, firm, gray.				
7		2.5					4.4	▽
8				Silty clay, abundant, natural organics, i.e., roots, gray, soft, very moist.				
9								
10		2.5						
11				- very soft, gray, very moist.			291	
12								
13		3.5		Sandy silt, very moist, gray.				
14		1.0		- sandy, gray, very fine, wet.				
				Total Depth - 14.5 ft bls				

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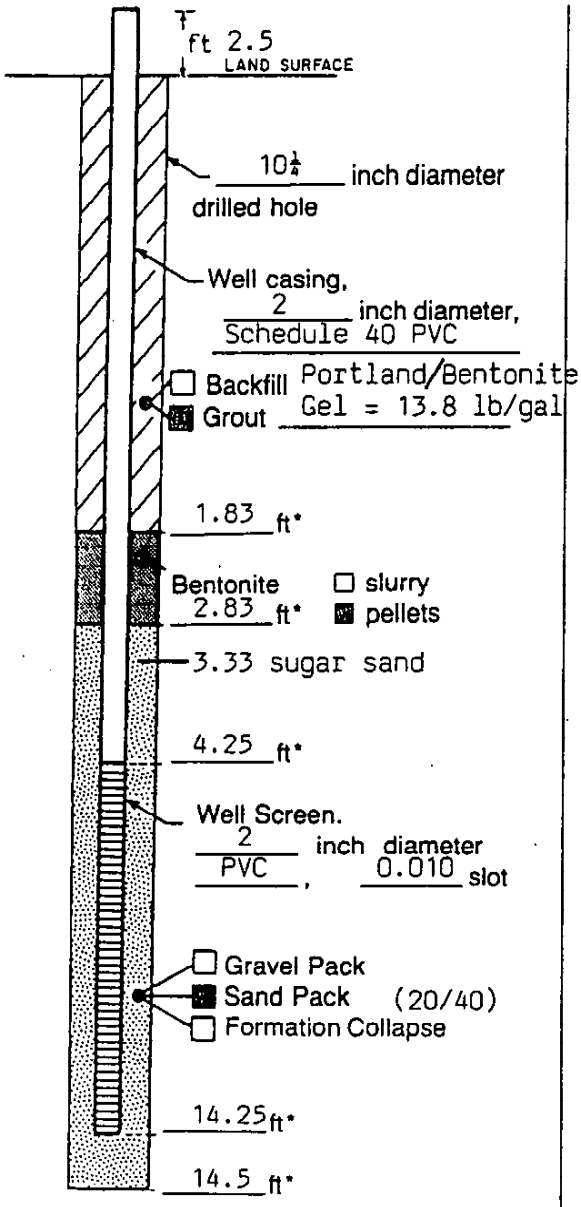
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA554.01 Well LMS-10
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) 05-28-92
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed 06-03-92

Fluid Loss During Drilling NA gallo
Water Removed During Development 2.5 gallo
Static Depth to Water NA feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Ground-water monitoring well

Remarks

Prepared by Kipper Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well LMS-11 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location West of Hwy. 23 & Landfill C Drilling Started 05-29-92 9:05 Drilling Completed 05-29-92 9:45

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Eric

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA Inches

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, ▽ Water First Encountered

Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0								
1				Fill, clay, shells.				
2		2.5		Clay, very hard, brown, ferrous concretions, some rootlets.		4.0/4.0	0.0	
3				Silty clay (20%), gray to brown.				
4				- silt seam.		3.25/3.25	0.0	
5		2.5		- hard, brown.				
6				- silty (40%), very moist, brown to gray, ferrous staining, soft.			0.0	
7		2.5		- wet, soft.				▽
8				- silt seam. wet, slightly clayey (2%).				
9				- back to silty clay (40%), wet.				
10		2.5		Silty sand, wet.				
11				Silty clay (40%),sandy (trace), gray, wet.				
12				Silty sand (40%), gray, wet.				
13		3.5		Total Depth - 13.5 ft bls				

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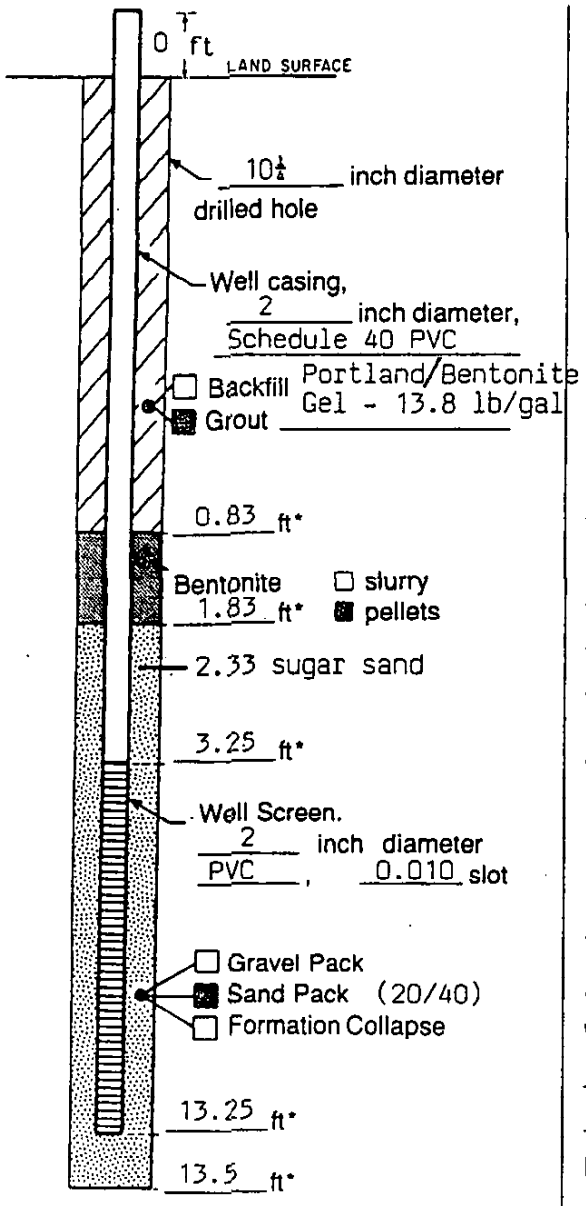
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical - LA554.01 Well LMS-11
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) 05-29-92
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed 06-03-92

Fluid Loss During Drilling NA gallo
Water Removed During Development 15 gallo
Static Depth to Water NA feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Ground-water monitoring well

Remarks

Prepared by Kipper Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LO

Boring/Well LMS-12 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location: Hero Property 50' W of Chevron, 200' S of NW Corner of Landfill C

Drilling Started: 05-27-92 11:30 Drilling Completed: 05-27-92 12:30

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used: None Drilling Method: Hollow Stem

Drilling Contractor: Eustis Engineering Driller: Pharoh Helper: Rev/Eric

Prepared By: Kipper Montgomery Hammer Weight: NA Hammer Drop: NA inches

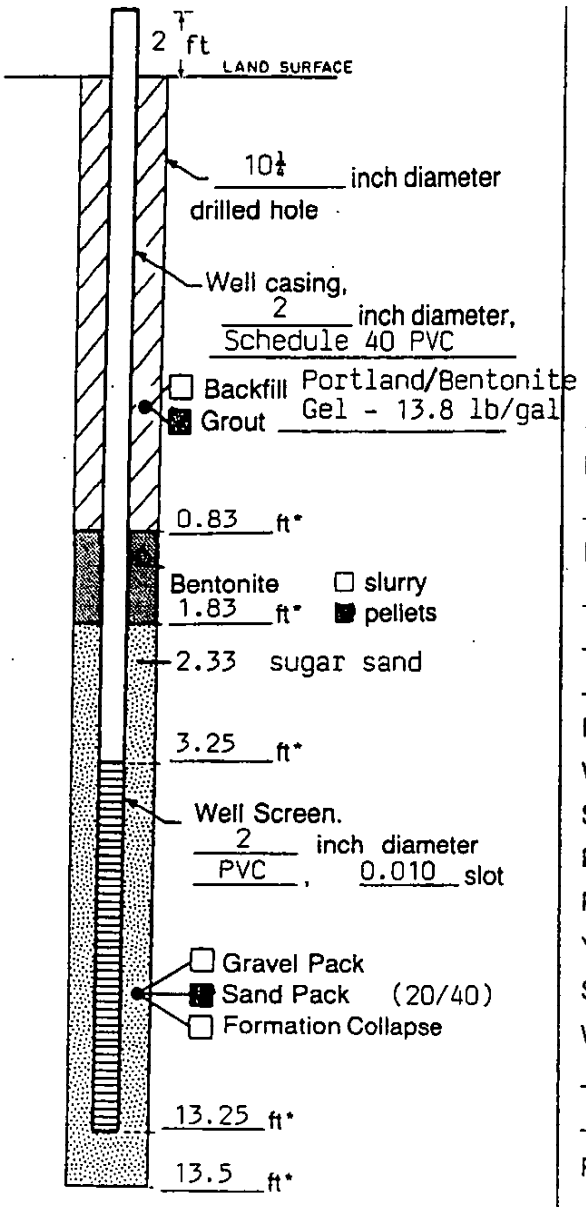
Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0								
1				Silt, dead vegetation.				
2				Clay, dark brown,, hard, some natural organics.		3.5/3.0	0	
3		2.5		Silty clay (20%), brown, stiff, rootlets.				
4				- silt breaks.		4.0/4.0		
5		2.5		- 40% silt - silt layers (3"), then alternating clay-silt. - less silty (20%), gray, moist in fractures, abundant natural organics.		1.5/1.5	0	
6				- soft, gray, silty (30%), rootlets, very moist.				
7						0.75/0.75	0	▽
8		2.0		- brown, silty, wet clay, very soft.				
9				- roots (large).		<0.25/<0.25		
10		2.0		- gray, very soft. - ferrous colored natural organics persist.				
11				- very moist, very soft, gray, rootlets.		<0.25		
12								
13		3.0		Sandy silt (40%), very fine, gray, wet.				
				Total Depth - 13.5 ft bls				

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA554.01 Well LMS-12
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) 05-27-92
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed 06-03-92

Fluid Loss During Drilling NA gallc
Water Removed During Development 5 gallc
Static Depth to Water NA feet below M
Pumping Depth to Water NA feet below M
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Ground-water monitoring well

Remarks

Prepared by Kipper Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well LMS-13 Project/No. CHEVRON (LA554.01) Page 1 of 1

Site Location Parish Sewage Treatment Plant Drilling Started 05-20-92 13:56 Drilling Completed 05-20-92 14:40

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem

Drilling Contractor Eustis Engineering Driller Pharoh Helper Rev/Eric

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0				Grass.				
1				Sandy clay (20%), shells abundant, dry, brown, natural organics.			0.0	
2		1.25						
3								
4				- trace of silt, gray, slightly moist, some rootlets, soft to medium stiff.			1.0	
5		1.0						
6				Silty clay (20%), moist, soft.				
7				- stiff, light gray, heavy ferrous staining, wood fragments.			1.2	
8		2.0						
9				- silt pockets, very moist to wet.				▽
10		2.5		- wood in clay, firm to stiff.				
11				- silty, very moist, gray, rootlets.				
12				- silty (25%), very fine, gray, wet.				
13		3.5		Total Depth - 13.5 ft bls				

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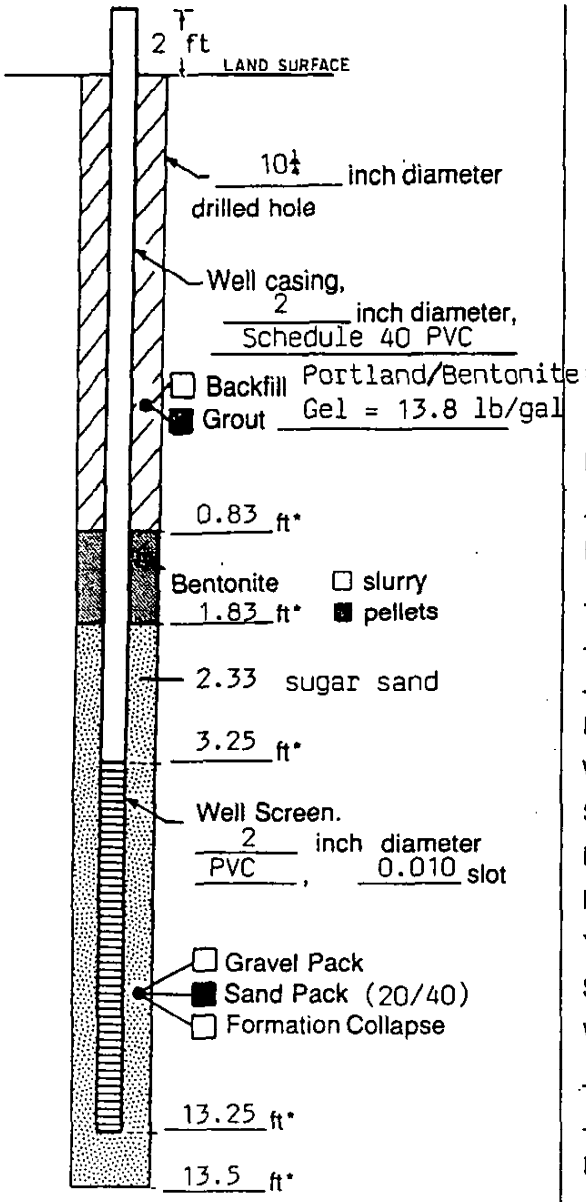
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA544.01 Well LMS-13
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) 05-20-92
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid None

Development Technique(s) and Date(s)
Hand bailed 06-03-92

Fluid Loss During Drilling NA gallo
Water Removed During Development 7.5 gallo
Static Depth to Water NA feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Ground-water monitoring well

Remarks

Prepared by Kipper Montgomery

MW-36 Between B-1 & B-8

LOG OF BORING

PROJECT: Solid Waste Landfill
LOCATION: 25-Acre Property, Belle Chasse, Louisiana

CLIENT: Chevron Chemical Company
Belle Chasse, Louisiana

BORING: B-7
FILE: 90B465C-4
DATE: 2/13/90
TECHNICIAN: RES
APPROVED: [illegible]
PAGE: 1 of 2

Dry Augered: 0' to 3' Wash Bored: 3' to 50'

Free water encountered at a depth of 3' during dry augering.

Coordinates: N 415,148 E 2,418,206 Ground Surface Elevation: 6.3

DEPTH (FEET)	SYMBOL	SAMPLE	SPT (b/ft)	Comp. Strength (tsf)	Moist. Content (%)	Dry Density (pcf)	L.L. (%)	P.I. (%)	Description of Stratum
0									Medium gray and brown CLAYS with silt pockets and streaks and ferrous nodules (CH)
				0.49	35	82			Soft to medium gray and brown Silty CLAYS with clay pockets, roots, sand pockets and ferrous nodules (CL)
5					50		73	46	Soft to medium gray and tan CLAYS with silt pockets and ferrous nodules (CH)
				0.64	44	77			
					39		38	15	Soft gray and brown Silty CLAYS with ferrous nodules (CL)
10									Loose gray Sandy SILTS with clay (ML)
					30				
15			5 b/f (1)						
			3 b/f						
			10 b/f						Firm gray Silty SANDS with clay pockets (SM)
20			16 b/f (2)						
			21 b/f						
25			2 b/f						Soft to medium gray and green-gray CLAYS with shell fragments and sand pockets (CH)
				0.69	55	66			
					42		42	24	Intermixed layers and lenses of very soft gray CLAYS, Sandy SILTS, and Silty SANDS (CH/ML/SM)
30				0.23	38	78			
					38				
35					51		81	52	---with black sand lenses, 37' to 38'
40			11 b/f NR						

Continued Next Page

(1) 83.5 percent passing the No. 200 sieve.
(2) 42.8 percent passing the No. 200 sieve.
NR = No Recovery.

Unified Soil Classifications based on limited laboratory test data and visual observations.

LOG OF BORING

PROJECT: Solid Waste Landfill
LOCATION: 25-Acre Property, Belle Chasse, Louisiana

CLIENT: Chevron Chemical Company
Belle Chasse, Louisiana

BORING: B-7
FILE: 90B465C-4
DATE: 2/13/90
TECHNICIAN: RES
APPROVED: [signature]
PAGE: 2 of 2

DEPTH (FEET)	SYMBOL	SAMPLE	SPT (b/ft)	Comp. Strength (tsf)	Moist. Content (%)	Dry Density (pcf)	L.L. (%)	P.I. (%)	Description of Stratum
40			7 b/f						Soft to medium gray Silty CLAYS with organic silts and fine sands (CL)
					26		34	13	Alternating layers of medium to stiff gray CLAYS, Clayey SILTS and firm Sandy SILTS (CH/ML)
45									
					32		55	33	Medium to stiff gray and light gray CLAYS with sandy silt layers, streaks and pockets (CH)
50									Bottom of boring at 50'
									Borehole grouted full depth

Unified Soil Classifications based on limited laboratory test data and visual observations.

Woodward-Clyde Consultants

LOG OF BORING

PROJECT: Solid Waste Landi...
LOCATION: 25-Acre Property, Belle Chasse, Louisiana

CLIENT: Chevron Chemical Company
Belle Chasse, Louisiana

BORING: B-8
FILE: 90B465C-4
DATE: 2/13/90
TECHNICIAN: RES
APPROVED: RK
PAGE: 1 of 2

Dry Augered: 0' to 2' Wash Bored: 2' to 50'

Free water encountered at a depth of 2' during dry augering.

Coordinates: N 414,863 E 2,418,082 Ground Surface Elevation: 6.2

DEPTH (FEET)	SYMBOL	SAMPLE	SPT (b/ft)	Comp. Strength (tsf)	Moist. Content (%)	Dry Density (pcf)	L.L. (%)	P.I. (%)	Description of Stratum
0					31		55	32	Soft to medium brown, tan and light gray CLAYS with silt pockets and ferrous nodules (CH)
				0.39	37	76			---with roots to 2'
5				0.47	58	67			---with wood pockets and organic matter, 4' to 6'
					54				
			(1)		38	84	47	26	Soft gray Silty CLAYS with clay layers, silt pockets and streaks and a trace of fine sand (CL)
10				0.32	40	76			Intermixed layers and lenses of soft gray Silty CLAYS, Clayey SILTS, and CLAYS with a trace of fine sand
			(2)						(CL/ML/CH)
15			11 b/f						Firm gray Sandy SILTS with a trace of clay (ML)
			18 b/f						
			16 b/f (3)						
20			25 b/f						Firm gray Silty SANDS with a trace of clay (SM)
			24 b/f (4)						---loose below 24'
25			5 b/f						
			2 b/f						Soft gray CLAYS with shell fragments (CH)
					59				---with a trace of silt to 28'
									---with sandy silt pockets and streaks below 28'
30					28		35	7	Intermixed layers and lenses of soft gray CLAYS, loose Silty SANDS, soft Silty CLAYS and Clayey SILTS
			(5)	0.22	24	90			(CH/SM/CL/ML)
35				0.54	45	72			
					30				
			9 b/f (6)						Firm gray Sandy SILTS with traces of clay (ML)
40									

Continued Next Page

(1) Kv = 4.46 x 10EE(-7) cm/sec. (2) 88.4% passing the No.200 sieve. (3) 77.7% passing the No. 200 sieve. (4) 9.4% passing the No. 200 sieve. (5) Unconsolidated, undrained triaxial compression test run at 12.1 psi confining pressure. (6) 72.5% passing the No. 200 sieve.

Unified Soil Classifications based on limited laboratory test data and visual observations.

Woodward-Clyde Consultants

LOG OF BORING

PROJECT: Solid Waste Landfill
LOCATION: 25-Acre Property, Belle Chasse, Louisiana

CLIENT: Chevron Chemical Company
Belle Chasse, Louisiana

BORING: B-8
FILE: 90B465C-4
DATE: 2/13/90
TECHNICIAN: RES
APPROVED: [illegible]
PAGE: 2 of 2

DEPTH (FEET)	SYMBOL	SAMPLE	SPT (b/ft)	Comp. Strength (tsf)	Moist. Content (%)	Dry Density (pcf)	L.L. (%)	P.I. (%)	Description of Stratum
40									Firm gray Sandy SILTS with traces of clay (ML)
			(1)	1.01	29	86			--- dense with wood fragments and organic material below 43'
45									
					28		38	16	Medium to stiff gray Silty CLAYS with some fine sand, clay pockets and a trace of organic matter (CL)
50									Bottom of boring at 50'
									Borehole grouted full depth

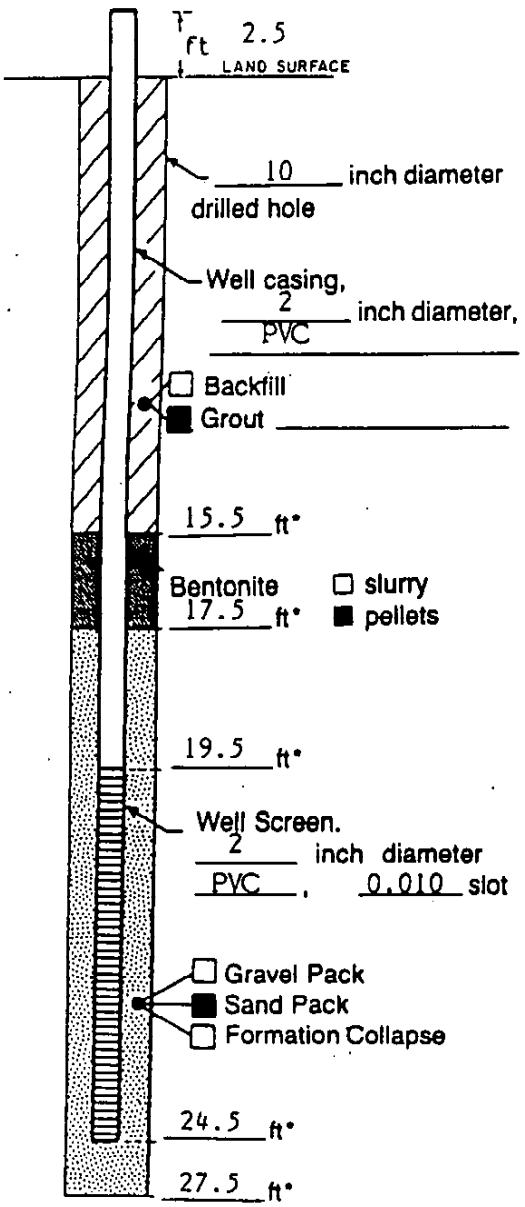
(1) Unconsolidated, undrained triaxial compression test run at 16.0 psi confining pressure

Unified Soil Classifications based on limited laboratory test data and visual observations.

Woodward-Clyde Consultants

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical - LA385.01 Well 56
Town/City Belle Chasse
County Plaquemines State Louisiana
Permit No. N/A
Land-Surface Elevation
and Datum 6 feet ☐ Surveyed ☐ Estimated
Installation Date(s) 3/6/91
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid N/A

Development Technique(s) and Date(s)
N/A

Fluid Loss During Drilling N/A gal
Water Removed During Development N/A gal
Static Depth to Water N/A feet below l
Pumping Depth to Water N/A feet below l
Pumping Duration N/A hours
Yield N/A gpm Date N/A
Specific Capacity N/A gpm/ft
Well Purpose Monitor well for landfill area

Remarks Had trouble sampling after 22.0 due to sand coming into the augers. Sampled clay at 27.5 to ensure lithology type.

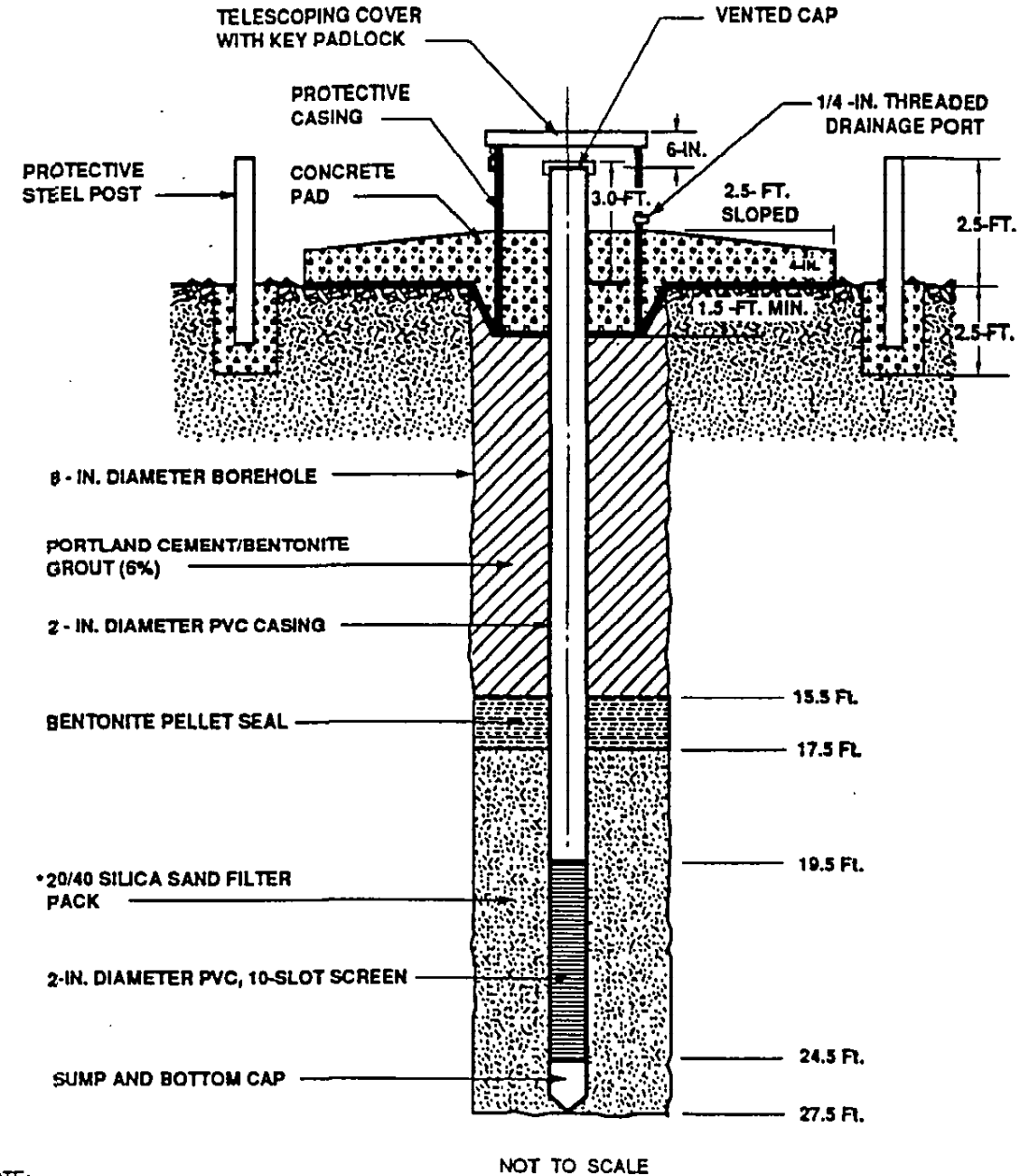
Prepared by Mike Manuel

GERAGHTY & MILLER, INC.
Ground-Water Consultants

MONITOR-WELL CONSTRUCTION DIAGRAM

BORING NO. MW - 56

PROJECT
CHEVRON CHEMICAL CO.
Belle Chasse, Louisiana



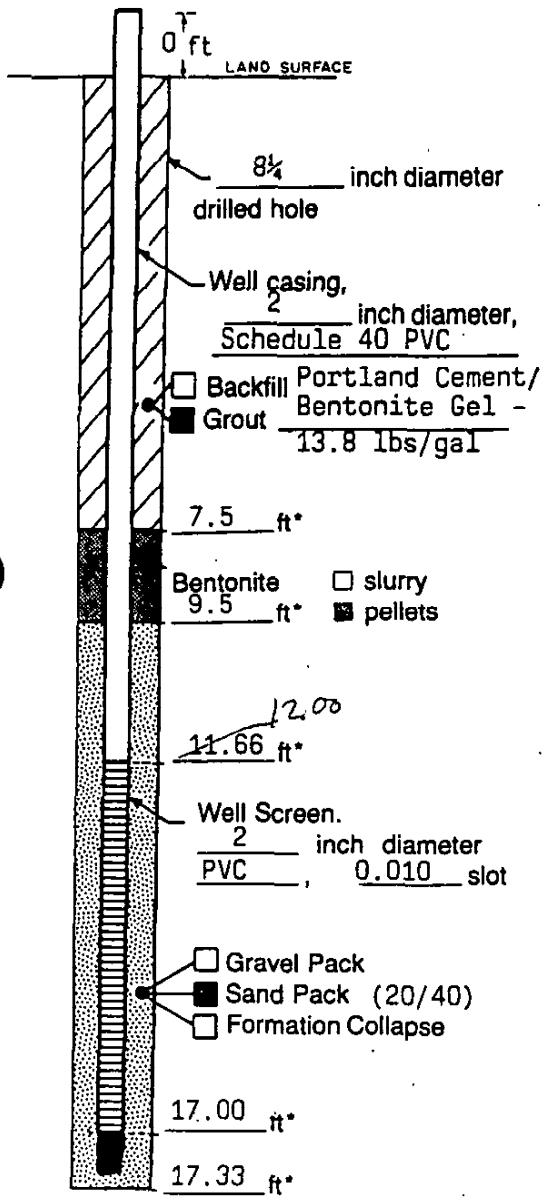
NOT TO SCALE

NOTE: * Depth May Vary Due To Site Conditions

NOTE: All Depth Measurements In Feet Below Ground Surface

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA0864.001 Well MW-EDA-01
Town/City Belle Chasse
County Plaquemine State LA
Permit No. _____
Land-Surface Elevation
and Datum _____ feet ☐ Surveyed
_____ ☐ Estimated
Installation Date(s) August 4, 1994
Drilling Method Hollow Stem
Drilling Contractor Eustis Engineering
Drilling Fluid NA

Development Technique(s) and Date(s)
August 5, 1994

Fluid Loss During Drilling None gallons
Water Removed During Development 10 gallons
Static Depth to Water 2.24 feet below M.P
Pumping Depth to Water N/A feet below M.P
Pumping Duration N/A hours
Yield N/A gpm Date N/A
Specific Capacity N/A gpm/ft
Well Purpose Upper clay groundwater monitoring well

Remarks Pre-installation length of Schedule 40 PVC riser and screen = 17.95', cut 0.95' of pipe riser. material consisted of 1-2.5' riser, 1-10' riser, 1-5' 0.010-in slotted screen, 4" bottom cap, 3-50 lb bags of 20-40 filter sand,3/4 bucket (50 lb) of puregold bentonite pellets, add 5 gallons of potable water
Grout formula: 3-94 lb bags of Portland cement to 25. gals of water to 14.1 lbs of bentonite gel (5%).
Prepared by K. Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well MW-EDA-1 Project/No. CHEVRON CHEMICAL COMPANY (LA0864.003) Page 1 of 1

Site Location Belle Chasse, Louisiana Drilling Started 08-03-94 1535 Drilling Completed 08-03-94 1645

Land-Surface Elev. NA feet ☐ Surveyed ☐ Estimated Datum NA

Drilling Fluid Used NA Drilling Method Hollow Stem Auger

Drilling Contractor Eustis Engineering Driller E. Held Helper G. Robinson

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (HW)	OVM (ppm)	REMARKS
0				Concrete (6-inches)				
1				Silty clay, gray-brown, stiff				
2				- silty				
3								
4								
5								
6								
7								
8								
9								
10		3.0		Silty clay, gray-brown, abundant natural organics, moist, soft, (10-20%)				
11				- tan, spherical concretions				
12								
13		3.0		- very soft, silty (40%) increasing				
14				Clayey silt (30%), gray, soft, moist, alternating clay, silt, sand partings, very moist to wet				
15								
16		3.0						▼
17								
18				Clay, abundant shells and shell fragments, gray, soft, trace of silt partings, moist				
				Total Depth 18.0 ft bls				

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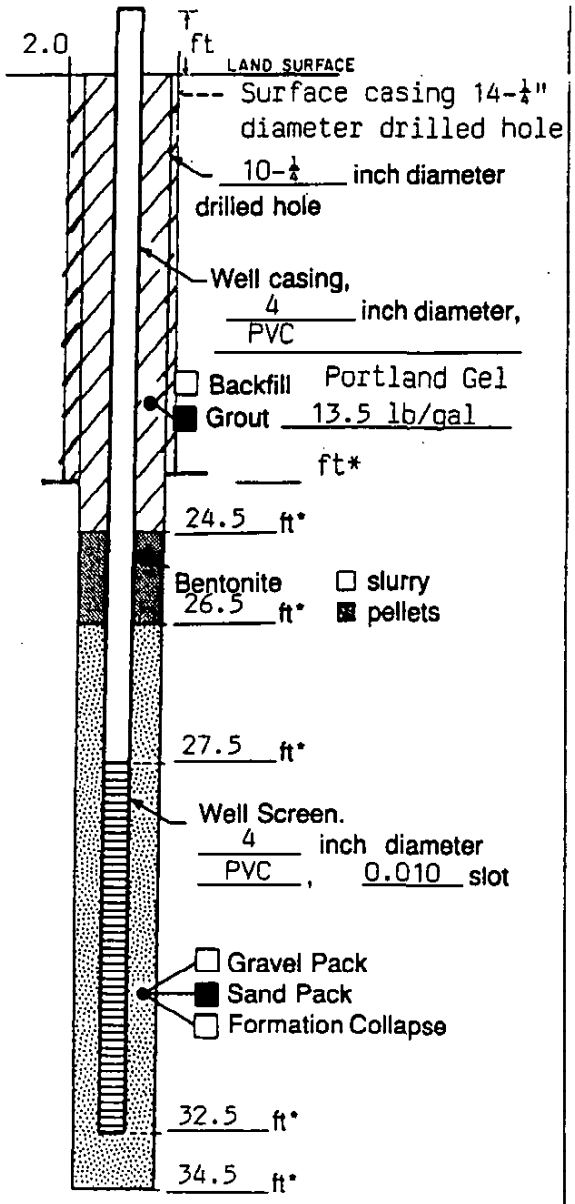
WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA40003 Well WS-1D
Town/City Belle Chasse
County Plaquemines State Louisiana
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) February 4, 1992
Drilling Method Wet Rotary
Drilling Contractor Eustis Engineering
Drilling Fluid Mud

Development Technique(s) and Date(s)
Air lift - February 12, 1992
Hand bailed - February 13, 1992

Fluid Loss During Drilling NA gallo
Water Removed During Development Air lift 25 gal + 22 gallo
Static Depth to Water 5.01 feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Temporary Monitor Well

Remarks The well is not producing like it should, I will redevelop by bailer.

Prepared by Kipper W. Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well WS-1D Project/No. CHEVRON CHEMICAL COMPANY (LA400.03) Page 1 of 2

Site Location FORMER WASTE STORAGE AREA Drilling Started 12-14-91 Drilling Completed 12-14-91

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Mud Rotary/Hollow Stem

Drilling Contractor Eustis Engineering Driller Henry/Lance Helper Eric/Tim

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill, Clay, Silty Clay, Sandy Clay, Silt, Clayey Silt, Sandy Silt, Sand, Silty Sand, Clayey Sand, Shelby Tube, Split Spoon, ▽ Water First Encountered, ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0–2				Concrete/asphalt, shells.				
3–4				Clayey Silt (30%), soft. - 6"waste residue mixed with silt and clay, nonaqueous material				Strong Odor
5–6		2.5		Silty Clay (25%), stiff (medium) gray natural organics. - soft to medium stiff.				Continued Odor
7–8		2.5						
9				- silty sand seam, brownish gray (2 to 3").				▽
10–12		2.5		- soft silty clay (30 to 40%), gray, moist, white to tan concretions throughout (waste residue), high natural organics.				
13–14		2.5		- clay, natural organics. - becoming sandy (10%), silty (30%).				
15–20		2.5		Silty Sand, clayey (10%), silty (25%), gray , wet (4.5' bls). - alternating seams of clay, silt, and fine sand (moist to wet).				
21–24		1.5		Clay, very soft, moist, gray, shell layers within. - trace of sand, with clay.				
25		1.5						

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SAMPLE/CORE LOG

Boring/Well WS-1D Project/No. CHEVRON CHEMICAL COMPANY (LA400.03) Page 2 of 2

Site Location FORMER WASTE STORAGE AREA Drilling Started 12-14-91 Drilling Completed 12-14-91

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Mud Rotary/Hollow Stem

Drilling Contractor Eustis Engineering Driller Henry/Lance Helper Eric/Tim

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA Inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
25								
26				Sandy Clay, sandy (25%), gray, moist.				No sample for OVM due to water
27				- sanding downward.				
				- 40% sand, fine gray.				
28		2.5		Sand, trace of silt, wet, gray, medium fine to fine, coarse.				
29								
30		2.5						
31				- no sample, used to plug to drill through.				
32								
33								
34								
35				- sandy clay, soft gray.				
36								
37				Sandy Clay, soft, gray.				
38		0.5						
				Total Depth - 38.0 ft bls.				

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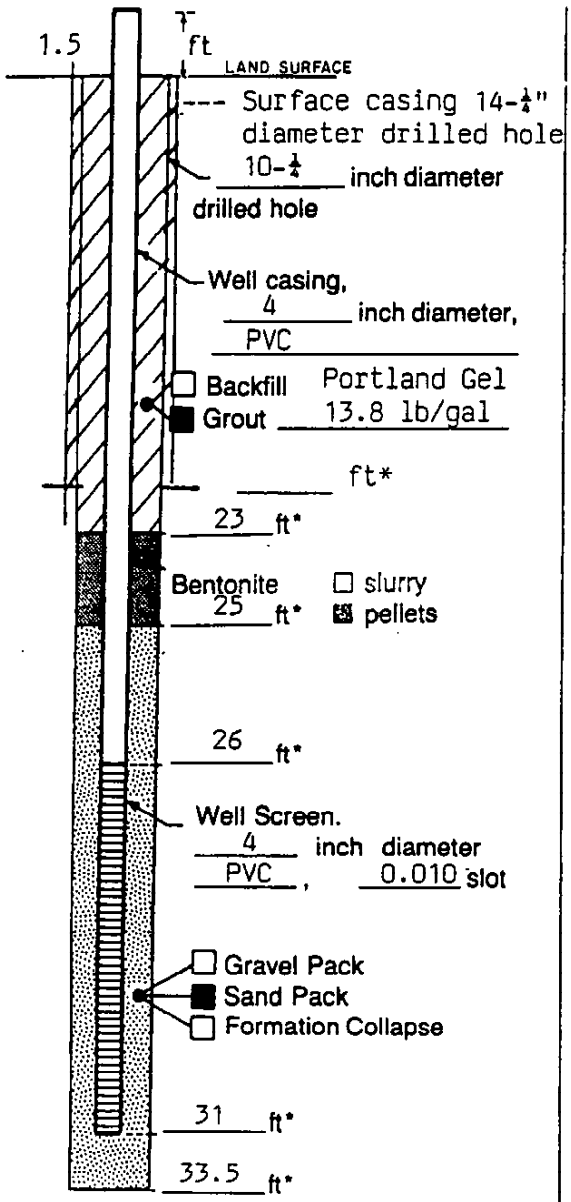
WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical LA40003 Well WS-2D
Town/City Belle Chasse
County Plaquemines State Louisiana
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) February 6, 1992
Drilling Method Mud Rotary
Drilling Contractor Eustis Engineering
Drilling Fluid Potable Water

Development Technique(s) and Date(s)
Air lift - February 12, 1992

Fluid Loss During Drilling NA gallo
Water Removed During Development 110 gallo
Static Depth to Water 2.5' feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Temporary Well

Remarks Sd 26#/ft = 33.5 -25 = 8.5 x 26 = 221#'s Pellets 20# x 2' = 40# pellets; 21' x 5.30 = 111 gallons ÷ 8.4 = 13.25 sacks cement; 13.25 x 4.7# bentonite = 62# bentonite; 111 gallons = 22 - 5 gallons buckets

Prepared by George Cook

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SAMPLE/CORE LOG

Boring/Well WS-2D Project/No. CHEVRON CHEMICAL COMPANY (LA400.03) Page 1 of 2

Site Location FORMER WASTE STORAGE AREA Drilling Started 01-04-92 10:15 Drilling Completed 01-04-92

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used Mud Drilling Method Mud Rotary

Drilling Contractor Eustis Engineering Driller Tex Helper Harold

Prepared By Kipper Montgomery Hammer Weight NA Hammer Drop NA inches

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, ▽ Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (H/V)	OVM (ppm)	REMARKS
0–2				Fill, sand, rocks, shells. - some clay.			0	
3		0		Clay shells, some nonaqueous material..		0.25/0.25		Strong Odor
4				- medium stiff.			137	
5		2.0		- decreasing shells, ferrous staining with some "ferrous" concretions, medium stiff-soft.		0.75/0.50		
6–7				- more nonaqueous material in silty breaks in clay (25%).			131	
8		2.0		Silty Clay, increased natural organics (rootlets), soft, gray to black, moist, silting (30%).		0.25/0.25		
9							11	
10		2.5						
11				- soft, "sticky", very moist, natural organics				▽
12							4	
13		2.5		- silting (40%).				
14				Sandy Clay (20 to 30%), gray, fine, very moist.			0	
15				Clayey Silt (20%), moist, gray, increasing clay downward.				
16				- some trace of sand , alternating partings.				
17		2.0		- clayey.				
18				Silty Clay (40%), trace of sand.				
19		2.0						
20				Clayey Sand (40 to 60%), dark gray, wet, very soft to soft.				
21				Clay, dark gray, 1/2" layer of shells and shell fragments.			0	
22				- moist, soft, pliable.				
23				- trace of sand lenses.				
24				- interlayered seams of sand and clay, soft, moist.				
25							0	

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SAMPLE/CORE LOG

Boring/Well WS-2D Project/No. CHEVRON CHEMICAL COMPANY (LA400.03) Page 2 of 2

Site Location FORMER WASTE STORAGE AREA Drilling Started 02-06-92 12:45 Drilling Completed 02-06-92

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used Potable Water Drilling Method Mud Rotary

Drilling Contractor Eustis Engineering Driller Henry Helper Harold

Prepared By George Cook Hammer Weight NA Hammer Drop NA inches

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, ▽ Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP (HW)	OVM (ppm)	REMARKS
25				Increase in sand content, trace of dark spots, organic staining.				
26								
27		2.5		Sand, fine-grained, (trace medium grain), medium dark gray, saturated.				▽
28				- sand, fine-grained, (most of sample washed out of tube), dark gray, saturated.				
29								
30		2.5		- saturated.				
31								
32				- medium grained, gray, streaks black, natural organic staining, saturated.				
33								
34				Total Depth - 34.0 ft bls.				

MW-35

Date Drilled: 3/15/83
Location: Adjacent to MW-27
Stratigraphy:
0 to 4 ft same as MW-27
9 to 15 gray clay
15 to 28 ft interbedded silt and sandy silt, grading to silty sand
28 to 30 ft sand, trace silt and clay
30 to 32 ft gray clay
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 29 ft of 1.25-inch PVC casing. Pushed screen and casing into caved sand at bottom of hole, then added sand to 60 inches above the screen, then 6-inch bentonite seal, and cement grout to surface with tremie tube. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2.5 ft. Top of PVC casing elevation is 10.72 ft above msl.

MW-36

Date Drilled: 3/15/83
Location: Near Chevron property line, outside fence, near Gate 3 and MW-13
Stratigraphy:
0 to 3 ft brown fill with shells
3 to 6 ft dense gray mottled brown clay
6 to 9 ft gray silty clay with roots and twigs
9 to 14 ft gray clayey sandy silt
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 10 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 5.30 ft above msl.

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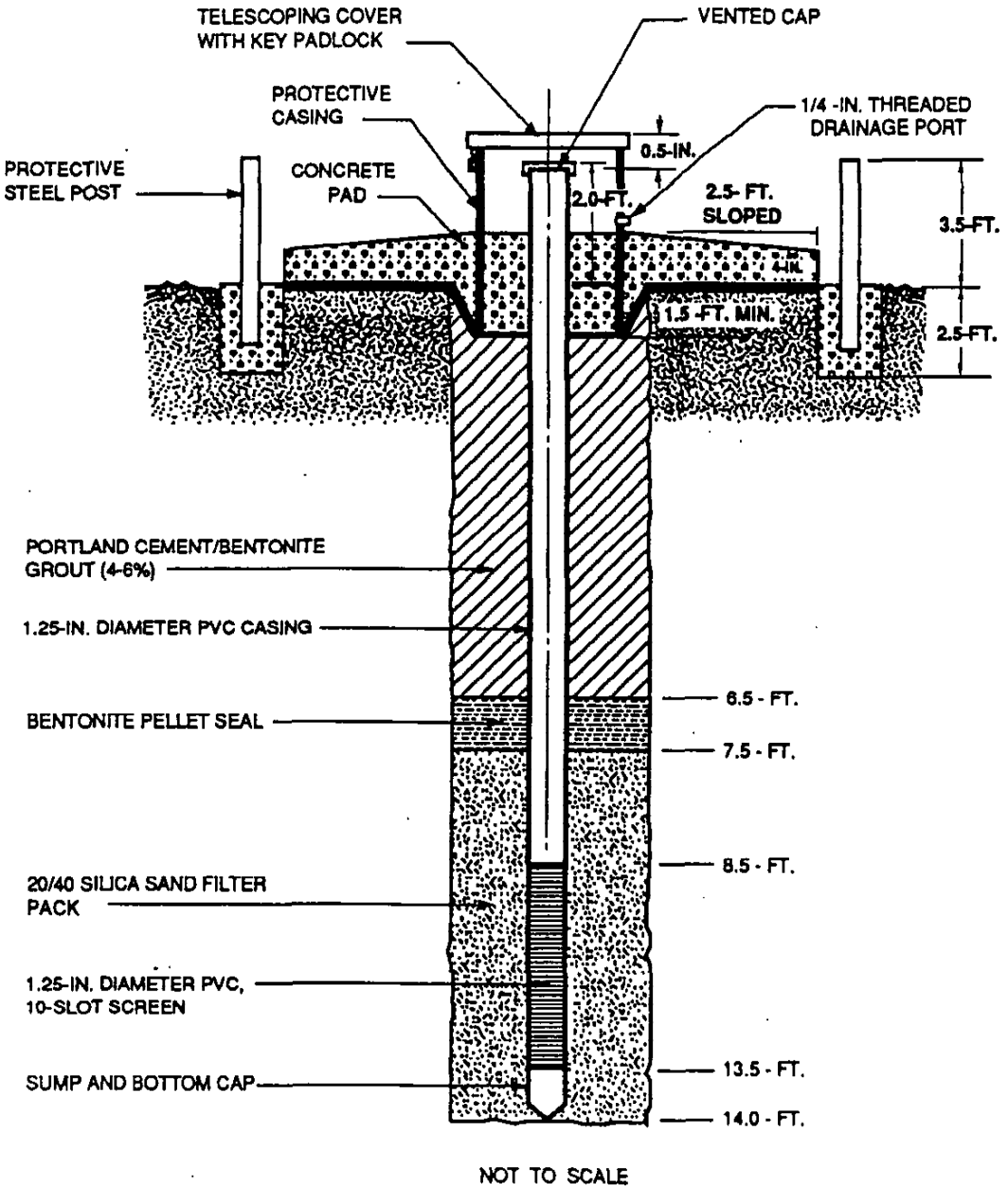
TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO.
MW-36

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-36

MW-35

Date Drilled: 3/15/83
Location: Adjacent to MW-27
Stratigraphy:
0 to 4 ft same as MW-27
9 to 15 gray clay
15 to 28 ft interbedded silt and sandy silt, grading to silty sand
28 to 30 ft sand, trace silt and clay
30 to 32 ft gray clay
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 29 ft of 1.25-inch PVC casing. Pushed screen and casing into caved sand at bottom of hole, then added sand to 60 inches above the screen, then 6-inch bentonite seal, and cement grout to surface with tremie tube. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2.5 ft. Top of PVC casing elevation is 10.72 ft above msl.

MW-36

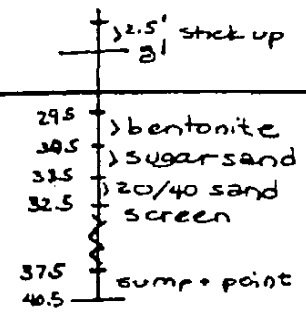
Date Drilled: 3/15/83
Location: Near Chevron property line, outside fence, near Gate 3 and MW-13
Stratigraphy:
0 to 3 ft brown fill with shells
3 to 6 ft dense gray mottled brown clay
6 to 9 ft gray silty clay with roots and twigs
9 to 14 ft gray clayey sandy silt
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 10 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 5.30 ft above msl.

BORING LOG

PROJECT NAME CHEVRON PROJECT NUMBER L495BC2 PAGE 1 OF 1
LOGGED BY L. COHEN APPROX. ELEV. _____ BORING NO. 35A
COORDINATES _____ DRILLING METHOD Mud Rotary DATE STARTED 9-24-85
GWL: DEPTH _____ ACTUAL TIME _____ DATE COMPLETED 9-24-85

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
4"ØPVC	+2.5-32.5				
4"Ø PVC Screen	32.5-37.5				
4"Ø PVC Sump	37.5-40.5				
+ point					

DEPTH	% SAMPLER RECOVERY	SAMPLE NO. AND TYPE	STRATA LOG	U.S.C.S. SYMBOL	MEASURED CONSISTENCY (TSF) Average (tons/ft²)	DESCRIPTION
3		Auger				Brown FILL and SHELLS
	65	S-1			0.82	3-4 SHELL AND FILL 4-6 CLAY, w sand lenses, micaceous, med to dk grey, oily streaks, moist
6						6 CLAY w sand lenses, micaceous, med. to dk. grey, oily streaks, moist, w Fe silty sandy layers
9	80	S-2			1.00	9 AS ABOVE w WOOD
12	85	S-3			4.88	12 CLAY, sandy silty lenses, micaceous, medium grey, lots of wood (woody) Some black oil, moist
15	80	Tube			<0.10	15 CLAY, woody, black organics, med grey w some lt. grey streaks and lenses, v. soft, moist to wet
18	80	Shelby			<0.10	17.5-18 SAND, micaceous, med. grey, med grain, moist 18 CLAY, silty and sandy, micaceous, med grey w some lt. grey lenses of med-fine grain sand, wood pieces
21	75				<0.10	soft, wet 21 Same as above w more sand lenses
24	75				<0.10	24 CLAY, silty w some sandy-silty layers, dark grey, w shells, some black organics, moist to wet
27	80				0.25	27 27-28 CLAY w sand layers, micaceous, med grey, very soft and wet 28-30 SAND, clayey w clay lenses, med grey, med grain, micaceous, some black organics and shell moist to wet
30	80				<0.10	30 30-31.5 CLAY w sand AS ABOVE 31.5-33 Sand, clay layers dk grey, med grain, trace black organics, very micaceous, very wet
33	85				<0.10	33 SAND, very micaceous, med. grey, med grain, black organic layers, very wet
36	90				<0.10	36 AS ABOVE
39	90				<0.10	39 AS ABOVE
40.5	90				<0.10	40.5



NOTE

TRACE	0 - 5 %
LITTLE	5 - 12 %
SOME	12 - 30 %
—Y	30 - 45 %
AND	45 - 55 %

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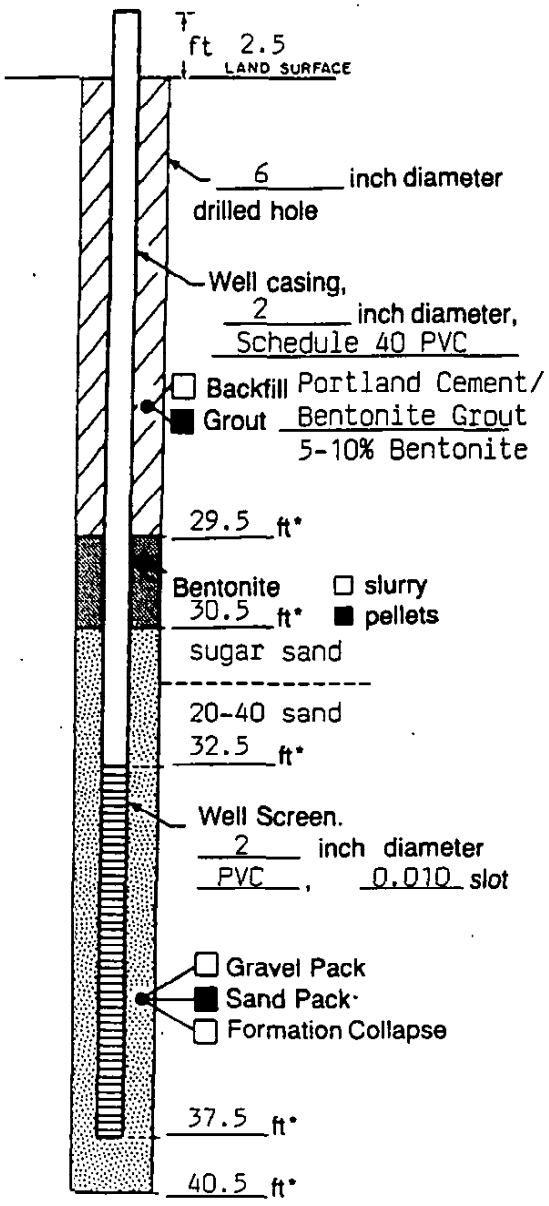
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron - L0495BC2 Well MW-35A
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed ☐ Estimated
Installation Date(s) September 24, 1985
Drilling Method Mud Rotary
Drilling Contractor Eustis Engineering
Drilling Fluid Mud/Water

Development Technique(s) and Date(s)
Airlift surge - September, 1985

Fluid Loss During Drilling Unknown gallo
Water Removed During Development Unknown gallo
Static Depth to Water Unknown feet below M.
Pumping Depth to Water Unknown feet below M.
Pumping Duration Unknown hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Louisiana Hazardous Waste Regulations Compliance Monitoring Wells

Remarks
Formed filled out with information from G&M 12-30-85.

Prepared by Kipper W. Montgomery

ARCADIS Geraghty & Miller, Inc.

SAMPLE/CORE LOG

Boring/Well MW-34R Project/No. CHEVRON CHEMICAL COMPANY (LA001703.0001) Page 1 of 2

Site Location Belle Chasse, Louisiana Drilling Started 07/22/98 Drilling Completed 07/22/98

Land-Surface Elev. 4 feet ☐ Surveyed ☐ Estimated Datum NA

Drilling Fluid Used NA Drilling Method Hollow Stem

Drilling Contractor Fugro Geosciences Driller Frank Helper Jerry

Prepared By K. Montgomery Hammer Weight NA Hammer Drop NA Inches

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | ▽ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ▼ Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP	OVM (ppm)	REMARKS
0–2		2.0	Fill	Fill material				
2–7		2.0	Silty Clay	Silty clay, gray, dry				
7–20		2.0	Silty Clay					
20–22		2.0	Clay	Clay, gray, dry				
22–25		2.0	Sandy Silt	Sandy silt, gray, wet				▽

ARCADIS Geraghty & Miller, Inc.

SAMPLE/CORE LOG

Boring/Well MW-34R Project/No. CHEVRON CHEMICAL COMPANY (LA001703.0001) Page 2 of 2

Site Location Belle Chasse, Louisiana Drilling Started 07/22/98 Drilling Completed 07/22/98

Land-Surface Elev. 4 feet ☐ Surveyed ☐ Estimated Datum NA

Drilling Fluid Used NA Drilling Method Hollow Stem

Drilling Contractor Fugro Geosciences Driller Frank Helper Jerry

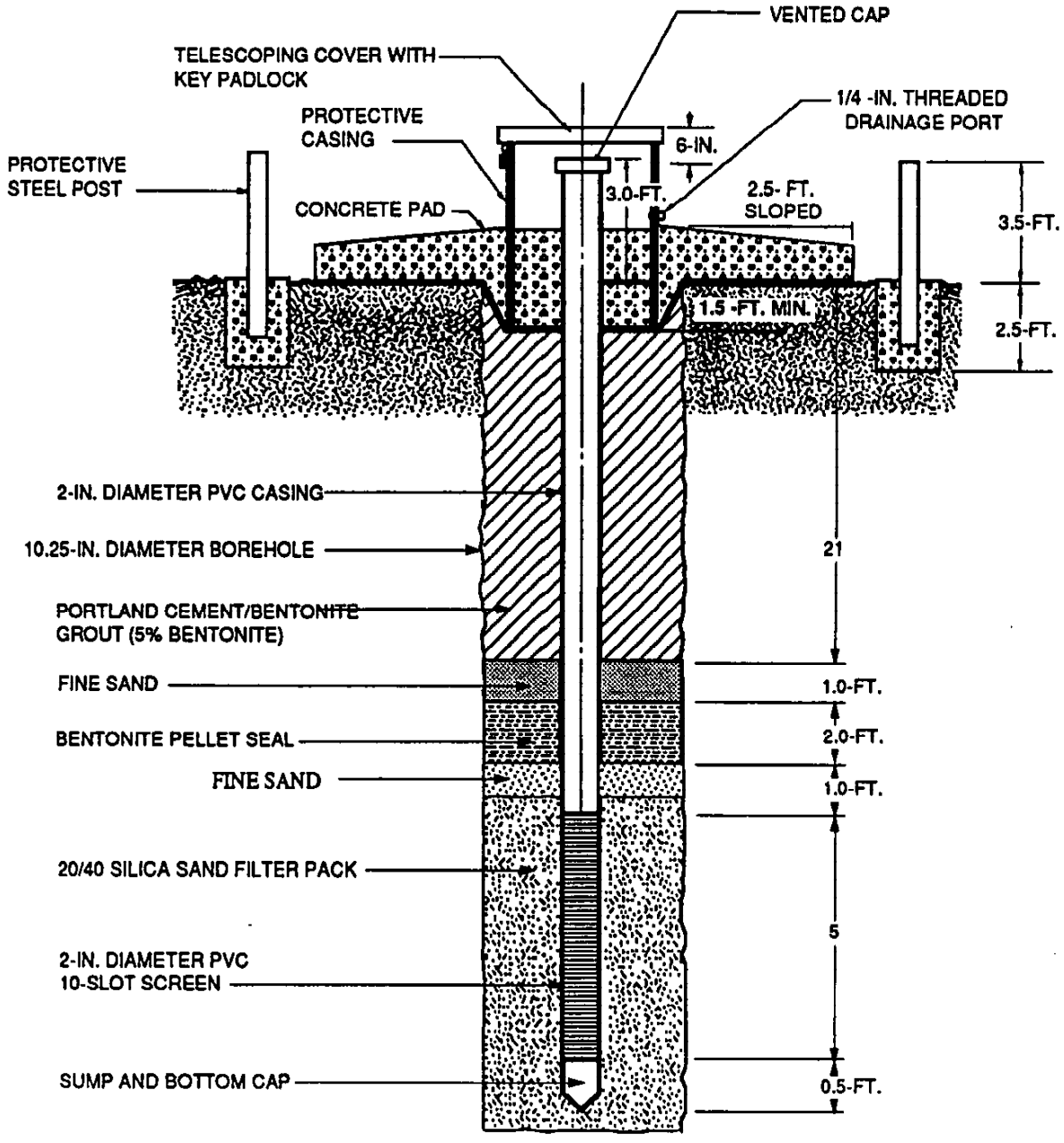
Prepared By K. Montgomery Hammer Weight NA Hammer Drop NA Inches

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, Water First Encountered

Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, Water Level After 10 Min.

SAMPLE DEPTH (Feet)	SAMPLE TYPE	RECOVERY (Feet)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP	OVM (ppm)	REMARKS
25								
26								
27		2.0						
28								
29		2.0						
30								
31		2.0						
32								
33		0.5		Total Depth - 33.5 ft bls				

MW-34R
Monitor Well Diagram

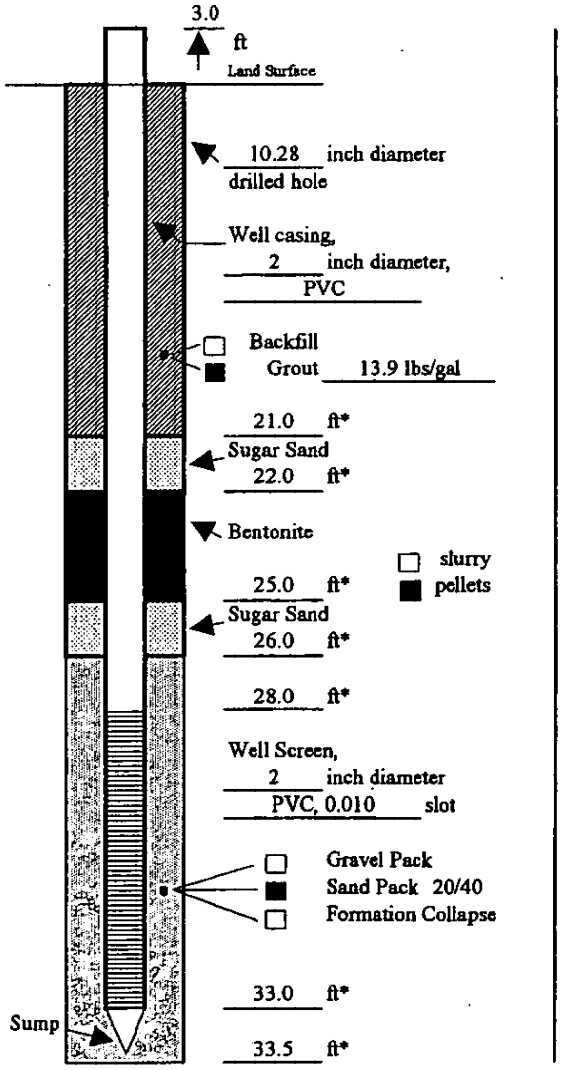


NOT TO SCALE

Chevron Chemical Company
Oak Point Plant
Belle Chasse, Louisiana
LA001703.0001

GERAGHTY & MILLER, INC.
Environmental Services
a heidemij company

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

Project	Chevron Chemical (LA001703.0001)	Well	MW-34R
Town/City	Belle Chasse		
County	Plaquemines	State	LA
Permit Number	NA		
Land-Surface Elevation and Datum	4 feet	☐ Surveyed ■ Estimated	
Installation Date(s)	7/21/98; 7/22/98		
Drilling Method	Hollow Stem Auger		
Drilling Contractor	Fugro Geoscience, Inc.		
Drilling Fluid	None		

Development Technique(s) and Date(s)
2" Rediflo pump

Fluid Loss During Drilling	None		gallons
Water Removed During Development	150		gallons
Static Depth to Water	3.77		feet below M.P.
Pumping Depth to Water	32		feet below M.P.
Pumping Duration	NA	hours	
Yield	NA gpm	Date	7/29/98
Specific Capacity	NA		gpm/ft
Well Purpose	Replacement well for MW-34 that was damaged.		

Remarks

Prepared by George Cook

* Depth Below Land Surface

CHEVRON\SAMPLING\Wells-mw34r\mw

MW-28

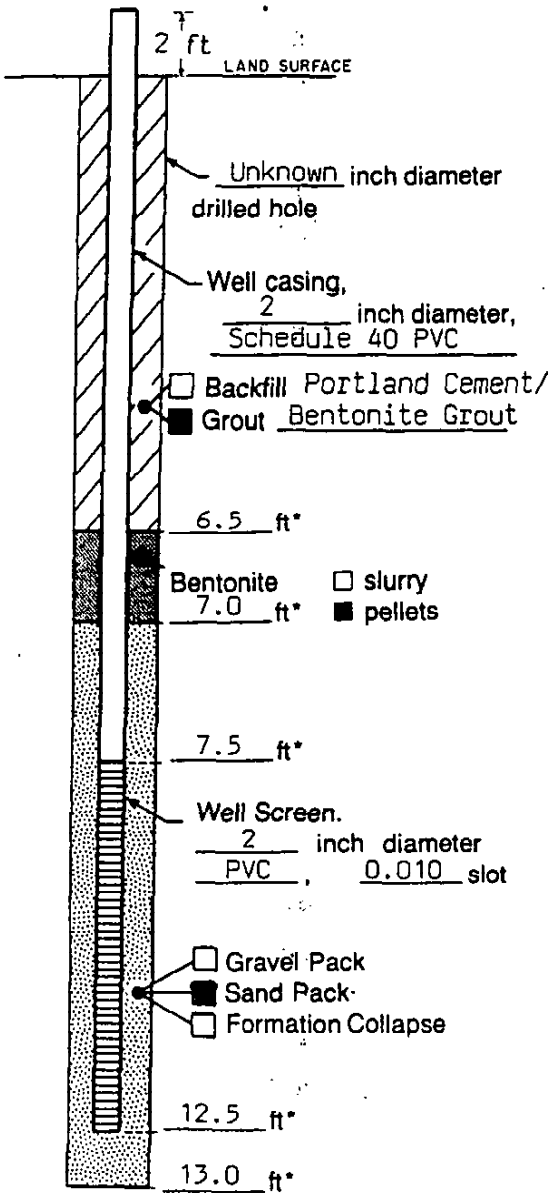
Date Drilled: 3/13/83
Location: Southwest corner of Landfarm C
Stratigraphy:
0 to 2 ft brown pebbly clay fill
2 to 6 ft soft gray mottled brown silty clay to clayey silt
6 to 10 ft dense gray mottled brown clay; last 6 inches has roots
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 7 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2.5 ft. Top of PVC casing elevation is 9.78 ft above msl.

MW-29

Date Drilled: 3/13/83
Location: South side of Landfarm C
Stratigraphy:
0 to 3 ft brown clay fill
3 to 7 ft gray oil-stained mottled brown clay, soft
7 to 9 ft dense gray clay with roots and twigs
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 9.81 ft above msl.

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Well MW-29A
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum _____ feet ☐ Surveyed
_____ ☐ Estimated
Installation Date(s) March 27, 1993
Drilling Method Unknown
Drilling Contractor G&M
Drilling Fluid Unknown

Development Technique(s) and Date(s)
Unknown

Fluid Loss During Drilling Unknown gallc
Water Removed During Development Unknown gallc
Static Depth to Water Unknown feet below M
Pumping Depth to Water Unknown feet below M
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Hydrogeologic Investigation

Remarks
No original well construction log accompained E&E's 1983 report. All information recorded on this document was reproduced from E&E's 1983 (May 23) report.

Prepared by Kipper W. Montgomery

MW-30

Date Drilled: 3/13/83
Location: Southeast corner main plant site, northeast of Oreco Park
Stratigraphy:
0 to 3 ft brown clay fill
3 to 9 ft gray mottled brown clay. At 6 ft is 3-inch layer soft silty clay and at 8 ft is 3-inch layer clayey, silty fine sand.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 10.68 ft above msl.

MW-31

Date Drilled: 3/13/83
Location: At 7th Avenue and levee, near MW-14
Stratigraphy:
0 to 2 ft brown fill with shells
2 to 4 ft gray mottled brown clay; black oil discoloration
4 to 7 ft gray mottled brown clayey silt, soft
7 to 8 ft dense gray clay
8 to 9 ft moderately dense gray clay with roots and twigs
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 1.5 ft. Top of PVC casing elevation is 7.13 ft above msl.

MW-30

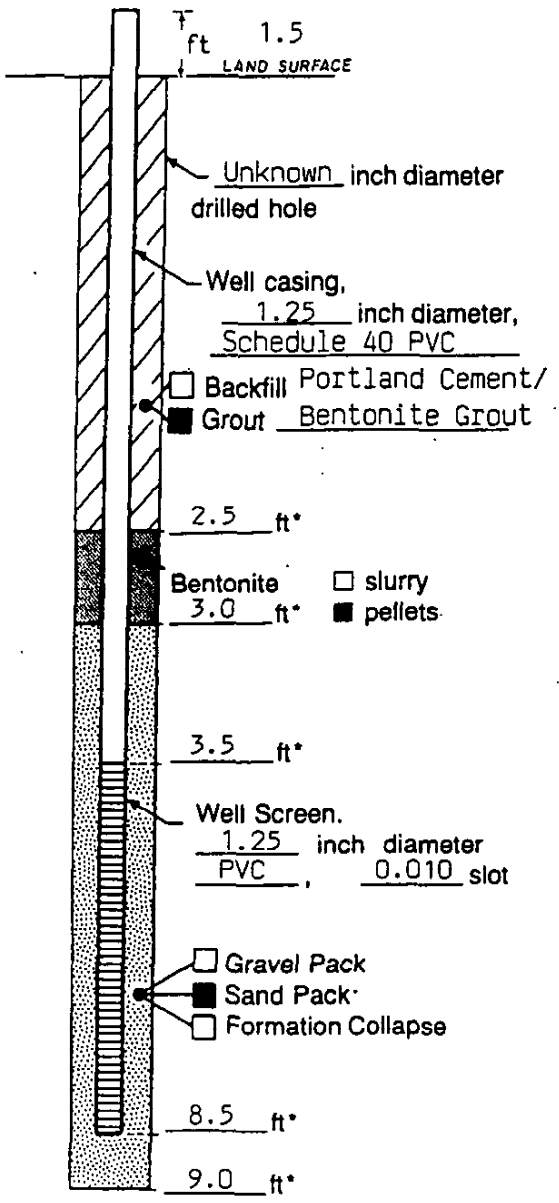
Date Drilled: 3/13/83
Location: Southeast corner main plant site, northeast of Oreco Park
Stratigraphy:
0 to 3 ft brown clay fill
3 to 9 ft gray mottled brown clay. At 6 ft is 3-inch layer soft silty clay and at 8 ft is 3-inch layer clayey, silty fine sand.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 10.68 ft above msl.

MW-31

Date Drilled: 3/13/83
Location: At 7th Avenue and levee, near MW-14
Stratigraphy:
0 to 2 ft brown fill with shells
2 to 4 ft gray mottled brown clay; black oil discoloration
4 to 7 ft gray mottled brown clayey silt, soft
7 to 8 ft dense gray clay
8 to 9 ft moderately dense gray clay with roots and twigs
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 1.5 ft. Top of PVC casing elevation is 7.13 ft above msl.

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical - LA554.01 Well MW-31
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum 7.13 feet (msl) ☐ Surveyed
☐ Estimated
Installation Date(s) March 13, 1983
Drilling Method Unknown
Drilling Contractor Ecology & Environment, Inc.
Drilling Fluid Unknown

Development Technique(s) and Date(s)
Unknown

Fluid Loss During Drilling Unknown gallo
Water Removed During Development Unknown gallo
Static Depth to Water Unknown feet below M
Pumping Depth to Water Unknown feet below M
Pumping Duration Unknown hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose hydrogeologic Investigation

Remarks
No orginial well constrctuion log accompanied E&E's 1983 report. all information recorded on this document was reproduced from E&E's 1983 (May 23) report.

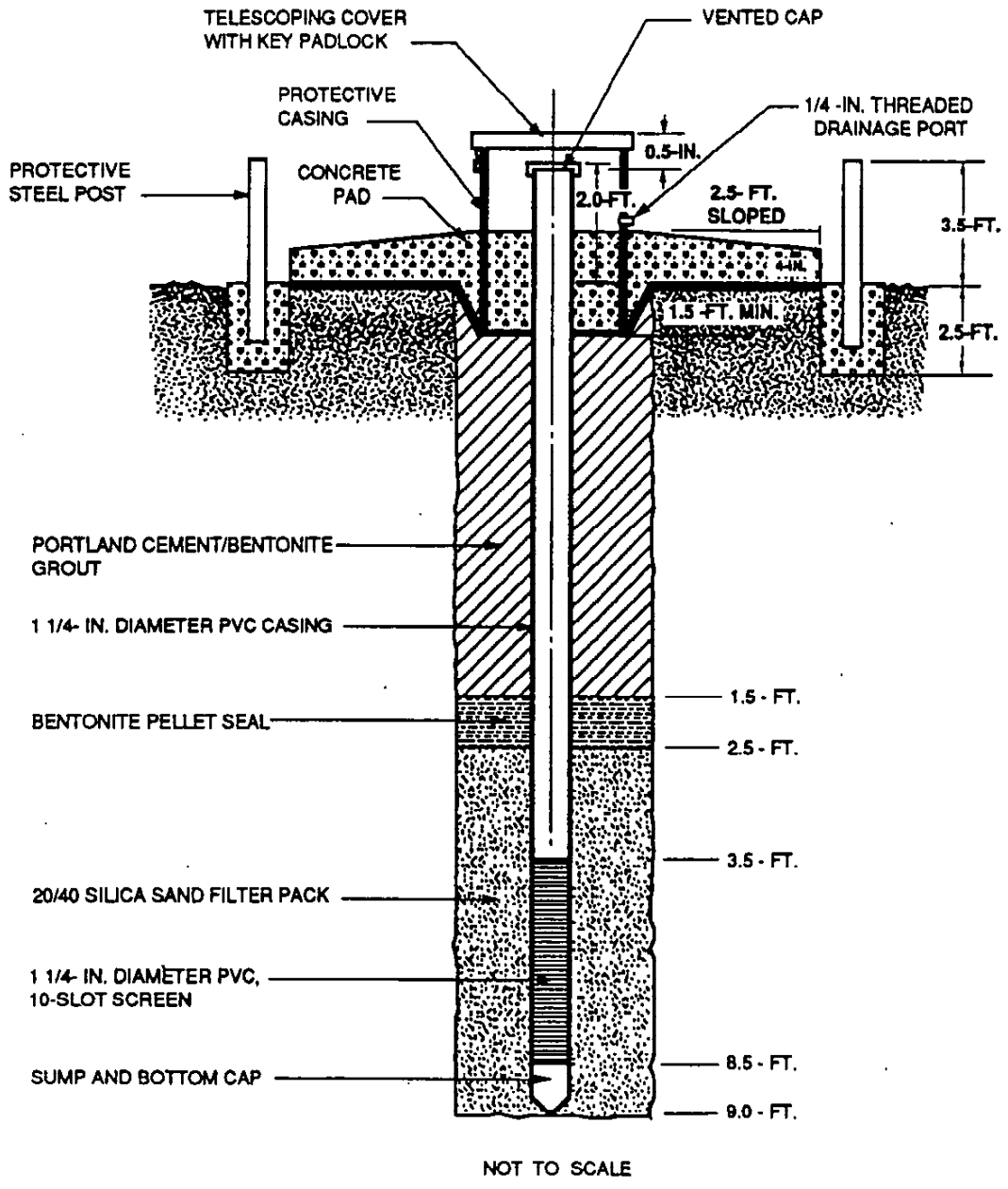
Prepared by Kipper W. Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-31

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-31

MW-32

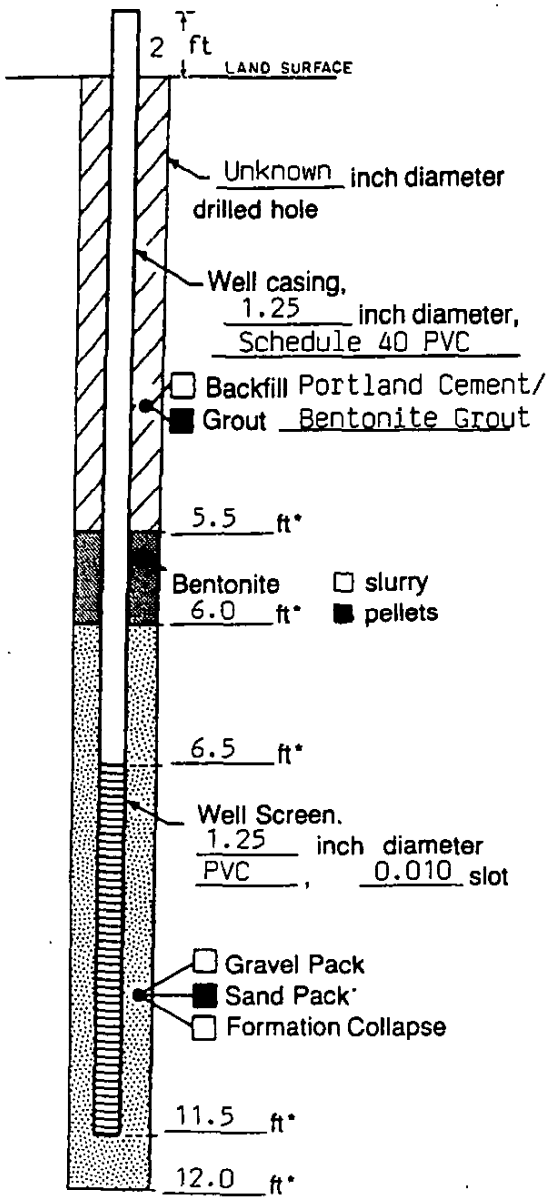
Date Drilled: 3/13/83
Location: At 10th Avenue and G Street, near MW-19
Stratigraphy:
0 to 2 ft brown shells and clay fill; oil discoloration
2 to 4 ft moderately dense gray mottled brown clay; oil discoloration
4 to 10 ft gray clay with roots and twigs, soft
10 to 12 ft gray clayey silt, soft. Last 1.5 ft of hole caved in.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 7 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 7.04 ft above msl.

MW-34

Date Drilled: 3/14/83
Location: Adjacent to MW-33
Stratigraphy:
0 to 9 ft same as MW-33
9 to 19 ft soft gray clayey silt to silty clay
19 to 26 ft gray silt to sandy silt
26 to 31 ft gray silty sand
Well Construction (hollow-stem auger):
Installed 5 ft of 1.25-inch PVC screen and 29 ft of 1.25-inch PVC casing. Pushed screen and casing into caved sand at bottom of hole, then added sand to 24 inches above the screen, then 6-inch bentonite seal, and cement grout to surface with tremie tube. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2.5 ft. Top of PVC casing elevation is 5.86 ft above msl.

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical - LA554.01 Well MW-32
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum 7.04 feet ☐ Surveyed
☐ Estimated
Installation Date(s) March 13, 1993
Drilling Method Unknown
Drilling Contractor Ecology & Environment, inc.
Drilling Fluid Unknown

Development Technique(s) and Date(s)
Unknown

Fluid Loss During Drilling Unknown gall
Water Removed During Development Unknown gall
Static Depth to Water Unknown feet below M
Pumping Depth to Water Unknown feet below M
Pumping Duration Unknown hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Hydrogeologic Investigation

Remarks
No original well construction log accompanied E&E's 1983 report. All information recorded on this document was reproduced from E&E's 1983 (May 23) report.

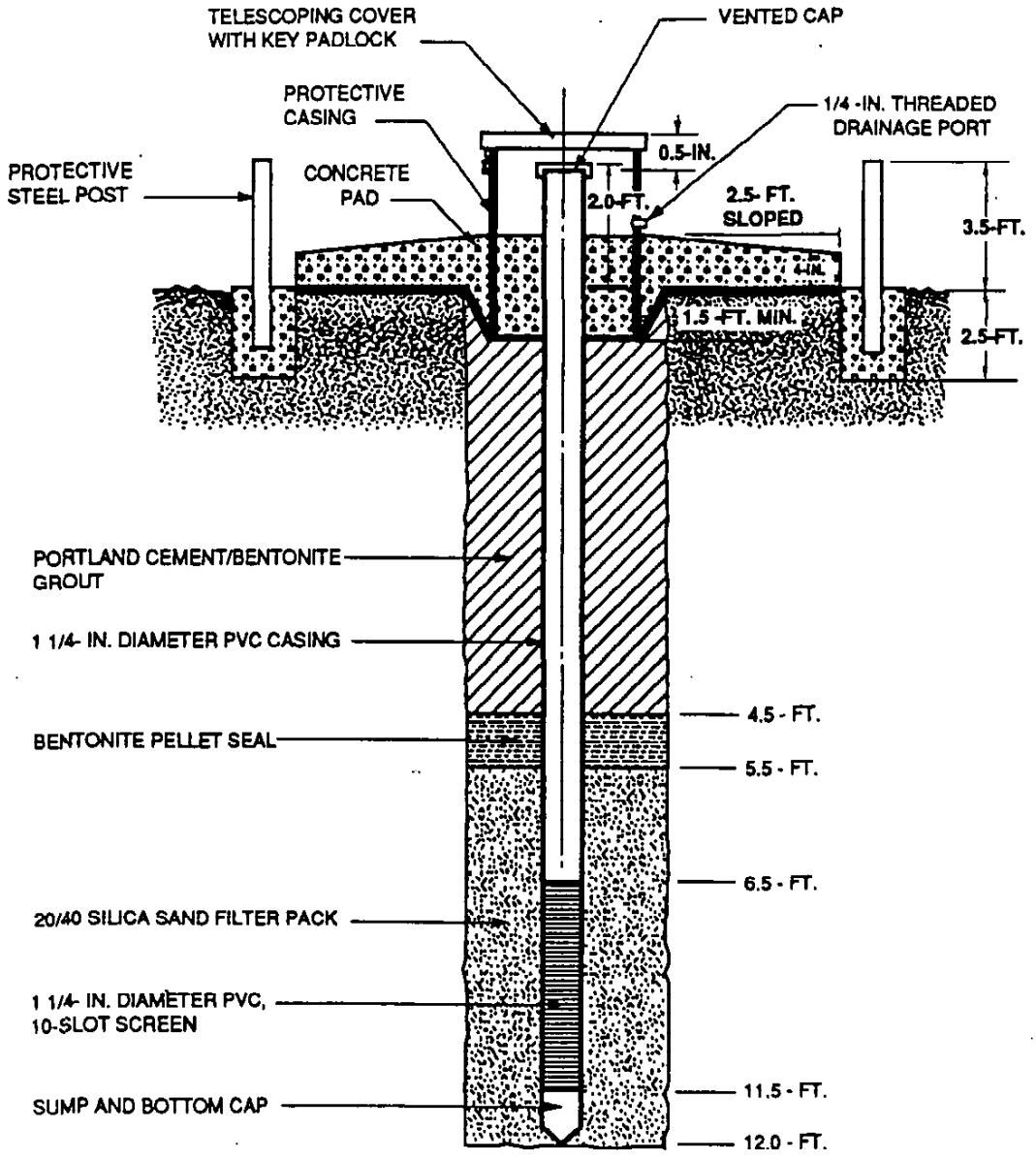
Prepared by Kipper W. Montgomery

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-32

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-32

ARCADIS G & M, Inc.
2900 West Fork Dr., Suite 540
Baton Rouge, LA 70827

SAMPLE / CORE LOG

Boring/Well: MW-28R Project No.: Chevron Oronite Co./LA002147.0001 Page 1 of 1

Site Location: Belle Chasse, Louisiana Drilling Started: 10-01-01 1028 Drilling Completed: 10-01-01 1145

Land-Surface Elev.: NA Surveyed: NA Estimated: NA Datum: NA

Drilling Fluid: None Drilling Method Used: Hollow Stem

Drilling Contractor: Fugro Geosciences Driller: NA Helper: NA

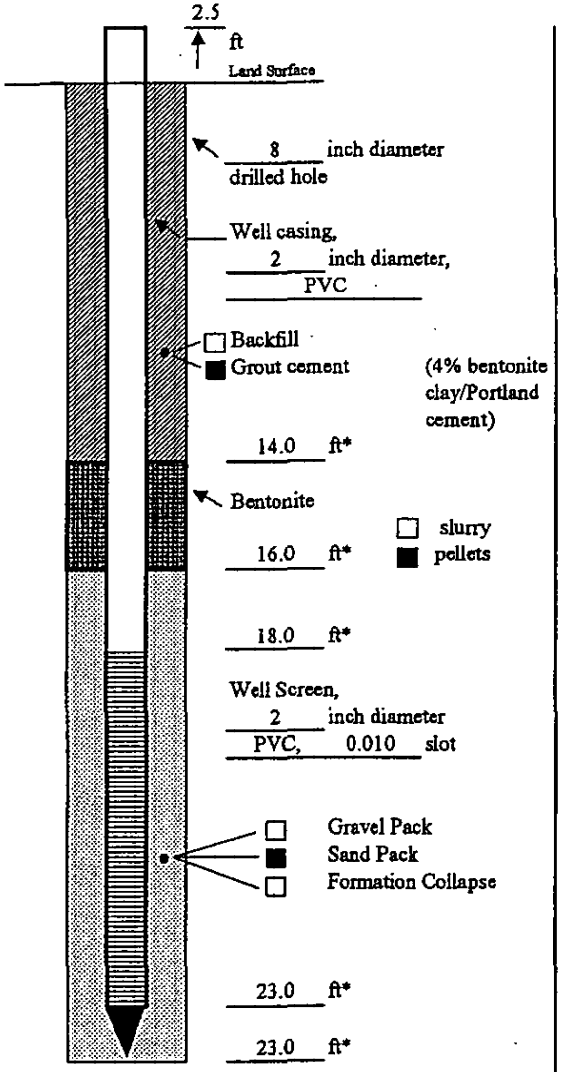
Prepared By: K. Montgomery Hammer Weight: NA Hammer Drop (inches): NA

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Acetate Sleeve | ⧖ Water First Encountered

Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | ⧗ Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H	PP V	OVM (ppm) (wo)	OVM (ppm) (w)	REMARKS
0–4		4.0		SILTY CLAY: brown/gray with red brown, trace of sand (fill clay), soft, damp - dark gray, organic rich						
4–5				SANDY SILT: dark gray with abundant natural organics, sandy silt w/clay, damp						
5–9		5.0		SILTY CLAY: gray blue, abundant natural organics, soft						
9–10				SAND: gray seam SILTY CLAY: light gray, clay in shoe, soft, wet						⧗
10–15		5.0		CLAY: brown gray w/natural organics, stiff, damp - wood fragments (cypress), within gray, soft, sticky clay, wet						
15–18		5.0		- blue gray, abundant wood fragments, silt laminations, soft						
18–20				SANDY SILT: trace of sand, soft, wet						⧖
20–22		3.0		SILTY SAND: gray, very fine, wet						
22–23				CLAYEY SAND: gray, trace of silt, trace of natural organics, soft TOTAL DEPTH - 23 ft bls						

ARCADIS G&M



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project	Chevron Oronite Co./LA002147.0001	Well	MW-28R
Town/City	Belle Chasse		
County/Parish	Plaquemines	State	Louisiana
Permit Number	NA		
Land-Surface Elevation and Datum	7.96 feet NGVD	■ Surveyed □ Estimated	

Installation Date(s)	10-1-01 and 10-2-01
Drilling Method	hollow stem
Drilling Contractor	Fugro
Drilling Fluid	None

Development Technique(s) and Date(s)
Hand bailed - 10-2-01

Fluid Loss During Drilling	None	None	gallons
Water Removed During Development		8.5	gallons
Static Depth to Water	10.52 ft bls		feet below M.P.
Pumping Depth to Water	NA		feet below M.P.
Pumping Duration	NA	hours	
Yield	NA gpm	Date	
Specific Capacity	NA	gpm/ft	
Well Purpose	Replacement Monitoring Well (Upper Clay Zone)		

Remarks: Top of casing elevation - 9.78 ft NGVD

Prepared by: K. Montgomery

MW-26

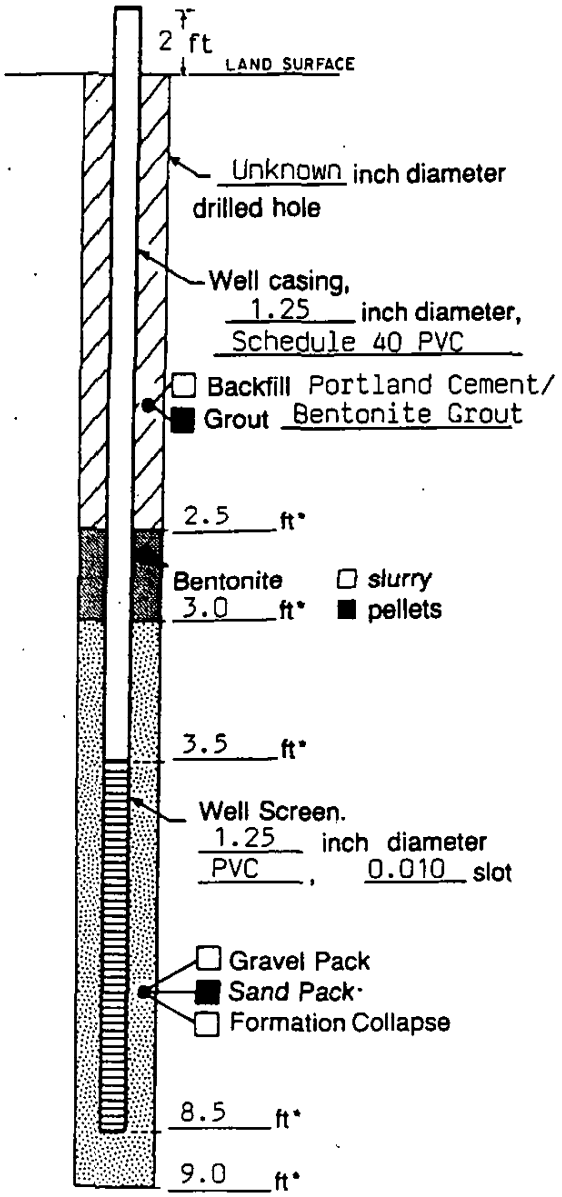
Date Drilled: 3/12/83
Location: North side of Landfarm C
Stratigraphy:
0 to 3 ft dark brown clay fill
3 to 7 ft gray mottled brown clay; dense
7 to 9 ft soft gray silty clay with roots and twigs
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 10.55 ft above msl.

MW-27

Date Drilled: 3/12/83
Location: Northwest corner of Landfarm C
Stratigraphy:
0 to 4 ft brown clayey fill with shells
4 to 8.5 ft gray mottled brown clay
8.5 to 10 ft gray clayey silt to silty clay with roots and twigs; black oil discoloration
10 to 12 ft as above, but without oil discoloration. Last 1 ft. of hole collapsed
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 12 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 10.37 ft above msl.

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Well MW-26
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum 10.55 feet (msl) ☐ Surveyed
☐ Estimated
Installation Date(s) March 12, 1983
Drilling Method Unknown
Drilling Contractor Ecology & Environment, Inc.
Drilling Fluid Unknown

Development Technique(s) and Date(s)
Unknown

Fluid Loss During Drilling Unknown gallo
Water Removed During Development Unknown gallo
Static Depth to Water Unknown feet below M.
Pumping Depth to Water NA feet below M.
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Hydrogeologic Investigation

Remarks
No original well construction log accompanied E&E's 1983 report. All information recorded on this document was reproduced from E&E's 1983 (May 23) report.

Prepared by Kipper W. Montgomery

MW-26

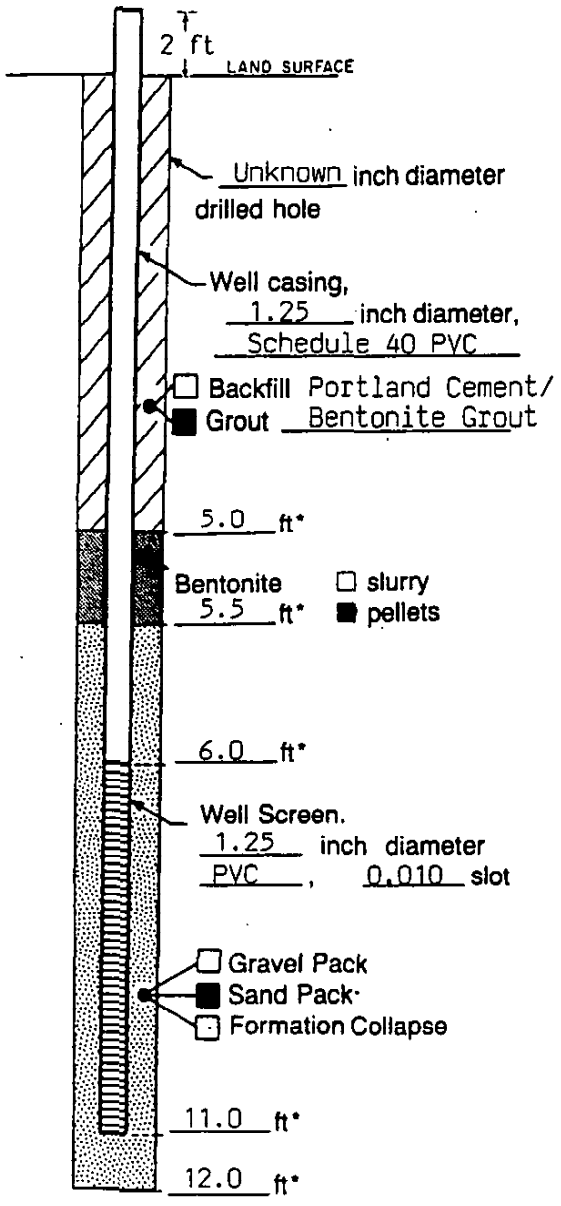
Date Drilled: 3/12/83
Location: North side of Landfarm C
Stratigraphy:
0 to 3 ft dark brown clay fill
3 to 7 ft gray mottled brown clay; dense
7 to 9 ft soft gray silty clay with roots and twigs
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 10.55 ft above msl.

MW-27

Date Drilled: 3/12/83
Location: Northwest corner of Landfarm C
Stratigraphy:
0 to 4 ft brown clayey fill with shells
4 to 8.5 ft gray mottled brown clay
8.5 to 10 ft gray clayey silt to silty clay with roots and twigs; black oil discoloration
10 to 12 ft as above, but without oil discoloration. Last 1 ft. of hole collapsed
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 12 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 10.37 ft above msl.

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Well MW-27
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum 10.37 feet (msl) ☐ Surveyed
☐ Estimated
Installation Date(s) March 12, 1993
Drilling Method Unknown
Drilling Contractor Ecology & Environment, Inc.
Drilling Fluid Unknown

Development Technique(s) and Date(s)
Unknown

Fluid Loss During Drilling Unknown gallc
Water Removed During Development Unknown gallc
Static Depth to Water Unknown feet below M
Pumping Depth to Water Unknown feet below M
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Hydrogeologic Investigation

Remarks
No orginial well construction log accompanied E&E's 1983 report. All information recorded on this document was reproduced from E&E's 1983 (May 23) report.

Prepared by Kipper W. Montgomery

MW-20

Date Drilled: 3/11/83
Location: South side of Oreco Park, near MW-2
Stratigraphy:
0 to 4 ft dark brown clay.
4 to 6.5 ft dark gray, mottled brown clay.
6.5 to 9 ft dark gray clay, dense, slightly moist at bottom.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 12 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 7.18 ft above msl.

MW-21

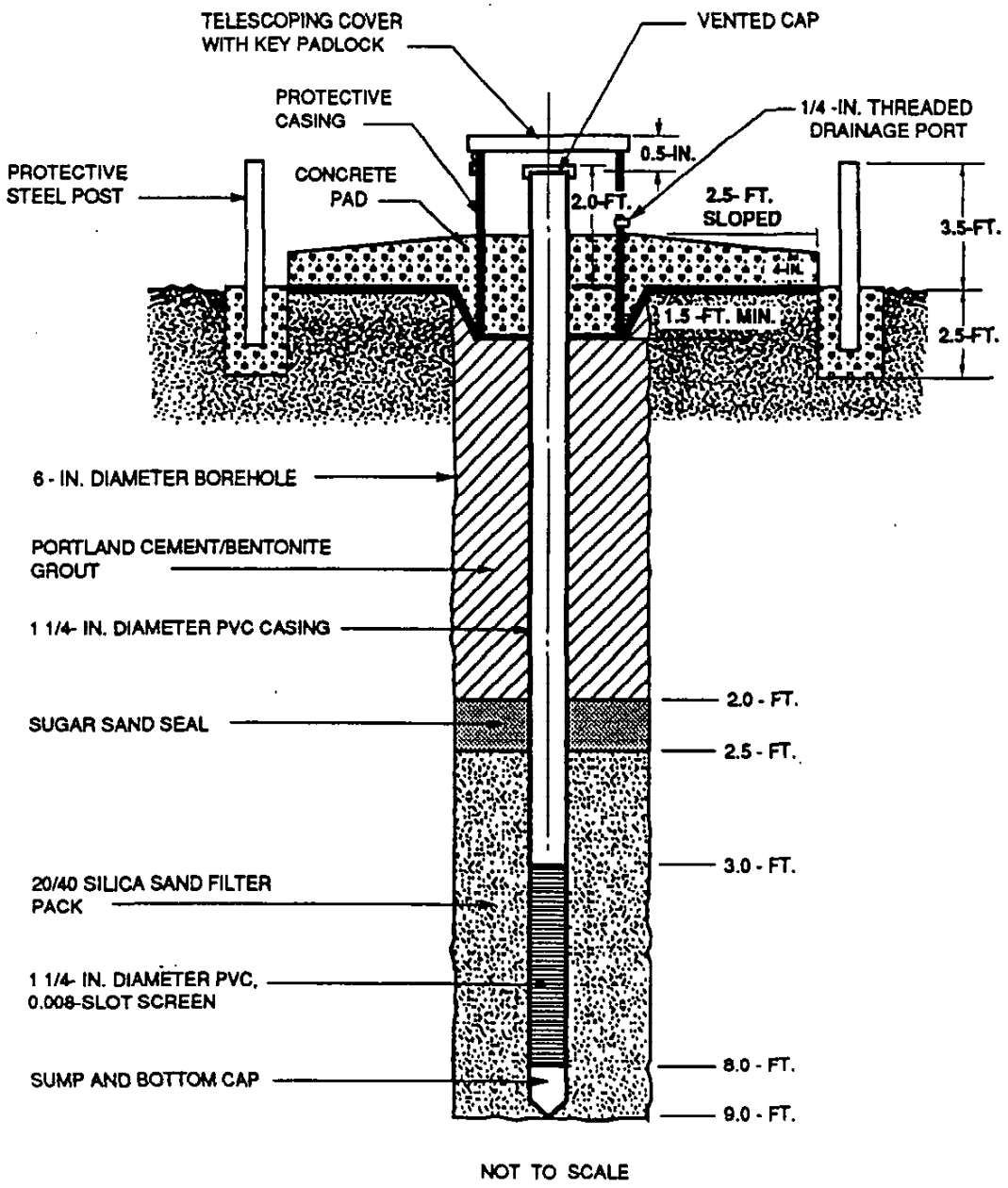
Date Drilled: 3/11/83
Location: West end of Landfarm B
Stratigraphy:
0 to 4 ft dark-brown clayey fill, rags at 3 feet
4 to 6 ft gray silty clay
6 to 9 ft brown to gray fill, roots at 6 ft, brown fibrous matter (filters?), and at bottom, green filter cake with fibers. Visible black oil at 7.5 ft.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 5.91 ft above msl.

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-20

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

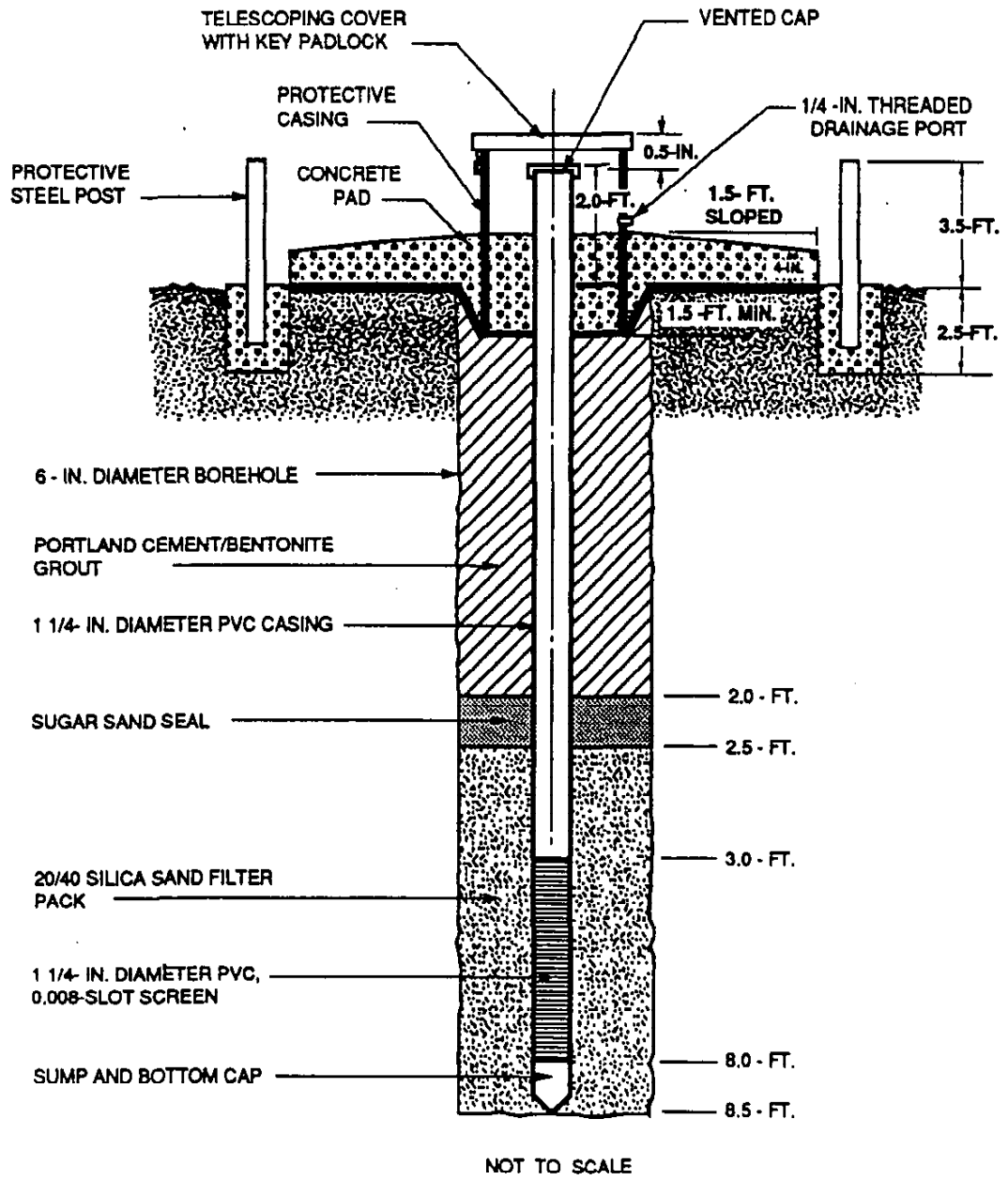
LA171.02-MW-20

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-21

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-21

MW-22

Date Drilled: 3/12/83
Location: East end of ditch on south side of Landfarm B
Stratigraphy:
0 to 3 ft gray-brown fill material including clay and shells
3 to 7.5 ft gray clay, mottled brown, dry
7.5 to 8.5 ft some clay, but softer and wet, some silt stringers also. This bottom foot caved upon withdrawal of the augers.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 3 ft. Top of PVC casing elevation is 11.46 ft above msl.

MW-23

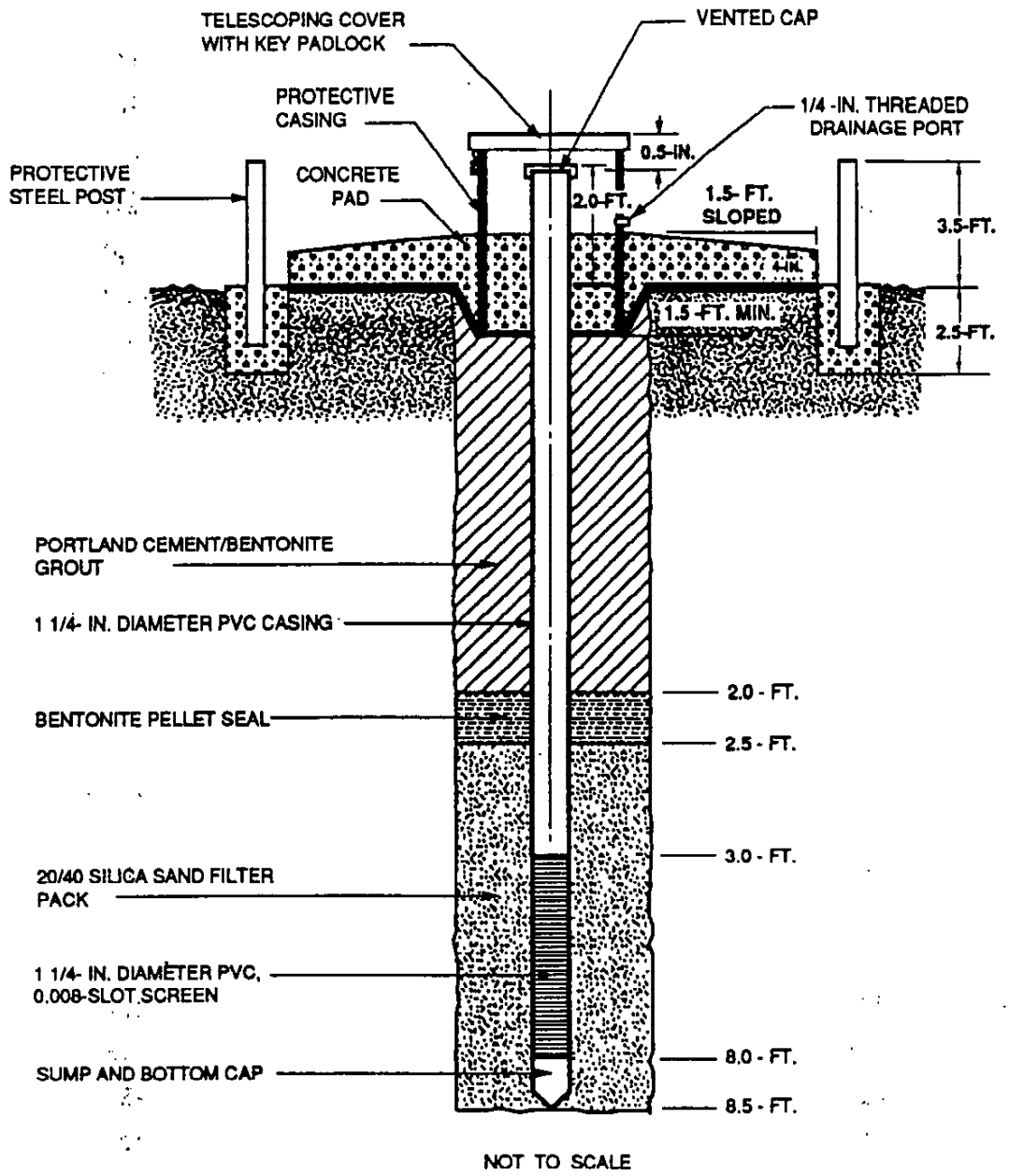
Date Drilled: 3/12/83
Location: East end of Landfarm B, near MW-1
Stratigraphy:
0 to 3 ft dark gray-brown fill
3 to 5 ft gray clay interbedded with gray silty clay, both mottled brown
5 to 9 ft gray mottled brown silty clay and clayey silt, trace fine sand. Especially silty, sandy zone at 7 ft.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 1.5 ft. Top of PVC casing elevation is 8.75 ft above msl.

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-22

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-22

MW-22

Date Drilled: 3/12/83
Location: East end of ditch on south side of Landfarm B
Stratigraphy:
0 to 3 ft gray-brown fill material including clay and shells
3 to 7.5 ft gray clay, mottled brown, dry
7.5 to 8.5 ft some clay, but softer and wet, some silt stringers also. This bottom foot caved upon withdrawal of the augers.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 3 ft. Top of PVC casing elevation is 11.46 ft above msl.

MW-23

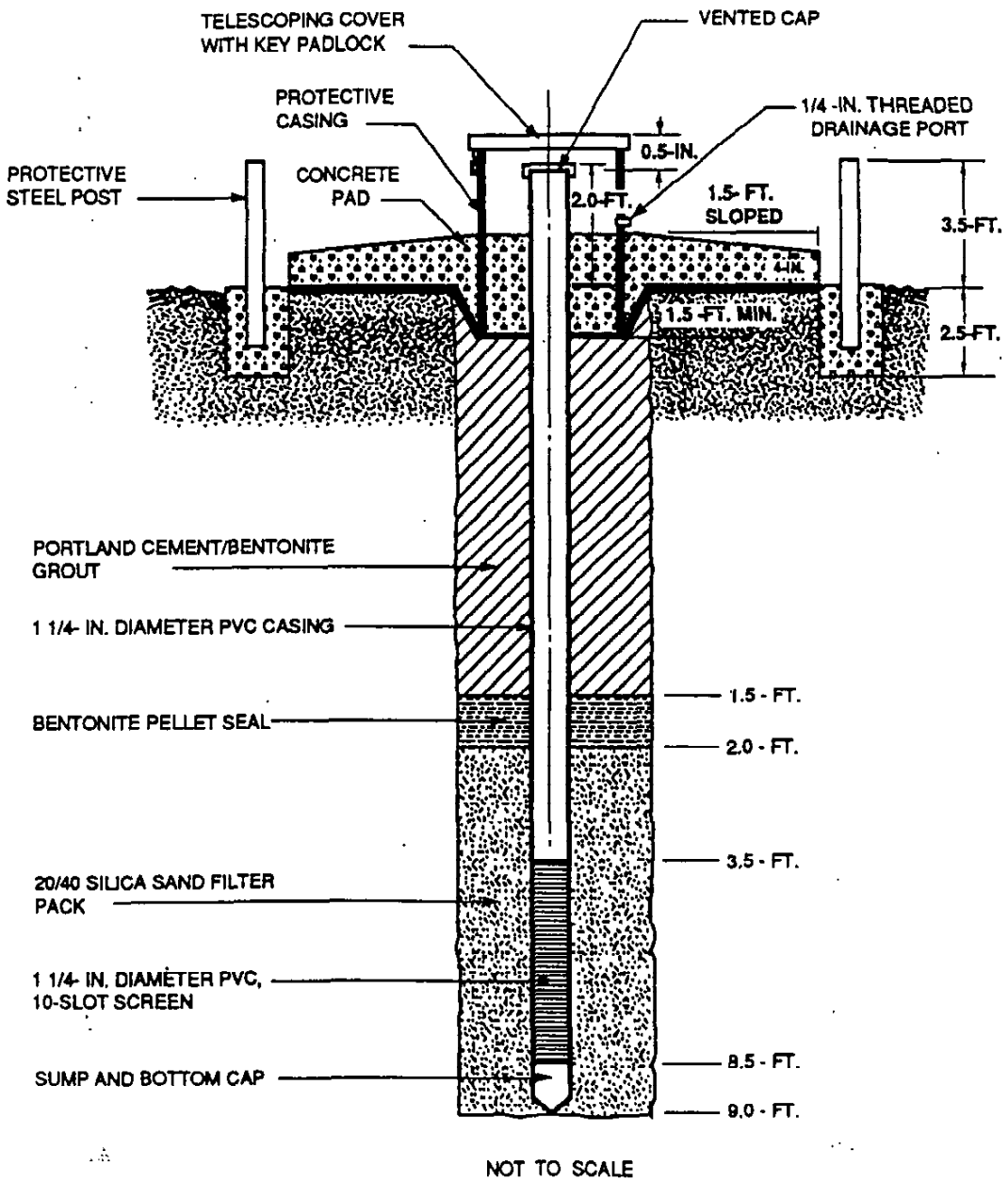
Date Drilled: 3/12/83
Location: East end of Landfarm B, near MW-1
Stratigraphy:
0 to 3 ft dark gray-brown fill
3 to 5 ft gray clay interbedded with gray silty clay, both mottled brown
5 to 9 ft gray mottled brown silty clay and clayey silt, trace fine sand. Especially silty, sandy zone at 7 ft.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 1.5 ft. Top of PVC casing elevation is 8.75 ft above msl.

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-23

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-22

MW-24

Date Drilled: 3/12/83
Location: North side Landfarm A, west of Oreco Park, near MW-3
Stratigraphy:
0 to 3 ft dark gray-brown clay fill with shells
3 to 4 ft very wet sandy, clayey silt with shells
4 to 6 ft dense gray mottled brown clay
6 to 9 ft moderately dense gray clay with plant roots and woody fibres; no mottling
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 6.65 ft above msl.

MW-25

Date Drilled: 3/12/83
Location: East end of Landfarm C, near MW-9
Stratigraphy:
0 to 3 ft dark brown clay and shell fill
3 to 7 ft gray mottled brown dense clay
7 to 14 ft soft clayey, sandy silt; wet. Last 1 ft of hole collapsed upon auger removed.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 10 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2.5 ft. Top of PVC casing elevation is 12.16 ft above msl.

MW-24

Date Drilled: 3/12/83
Location: North side Landfarm A, west of Oreco Park, near MW-3
Stratigraphy:
0 to 3 ft dark gray-brown clay fill with shells
3 to 4 ft very wet sandy, clayey silt with shells
4 to 6 ft dense gray mottled brown clay
6 to 9 ft moderately dense gray clay with plant roots and woody fibres; no mottling
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 6.65 ft above msl.

MW-25

Date Drilled: 3/12/83
Location: East end of Landfarm C, near MW-9
Stratigraphy:
0 to 3 ft dark brown clay and shell fill
3 to 7 ft gray mottled brown dense clay
7 to 14 ft soft clayey, sandy silt; wet. Last 1 ft of hole collapsed upon auger removed.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 10 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2.5 ft. Top of PVC casing elevation is 12.16 ft above msl.

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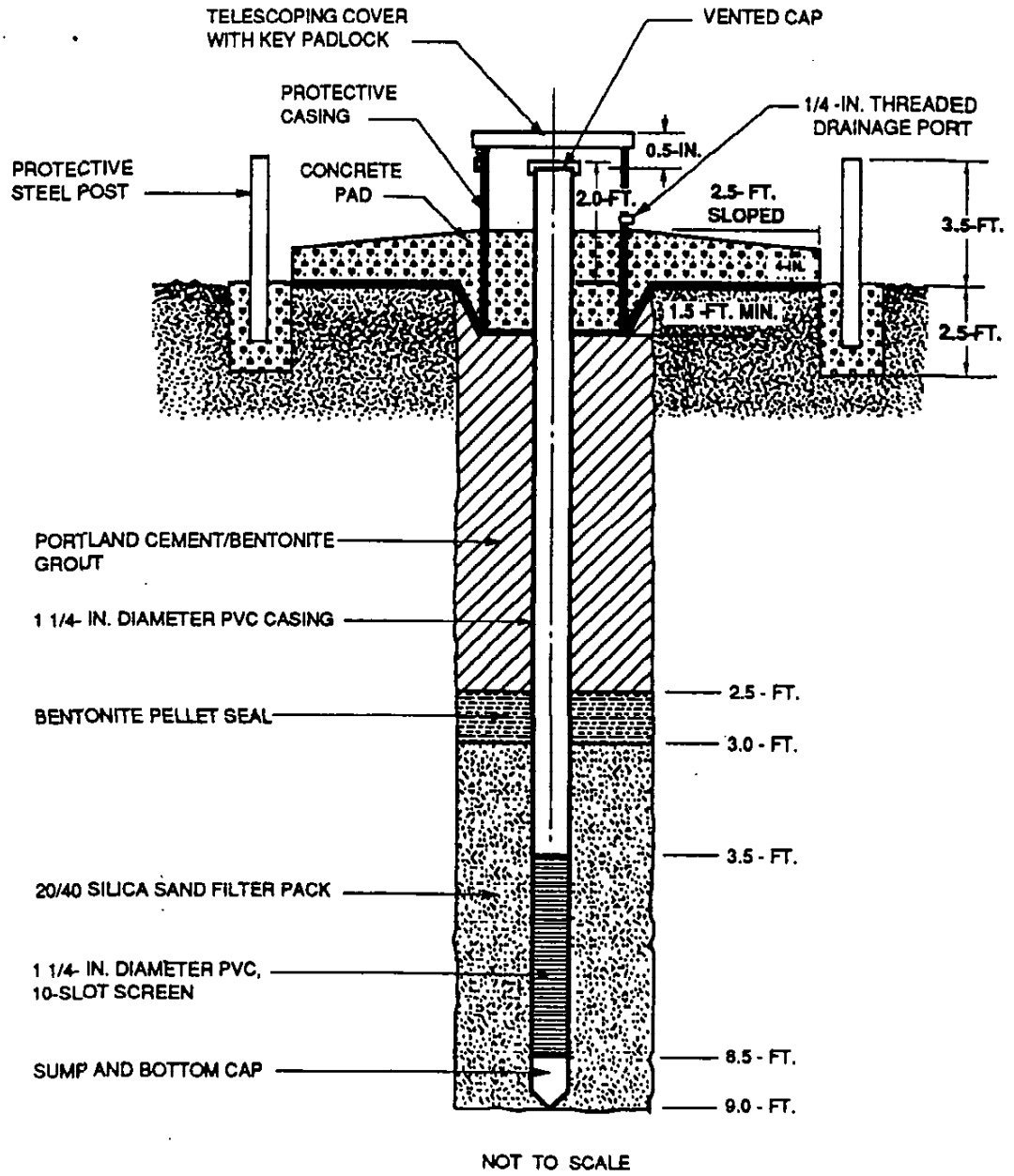
TYPICAL MONITOR-WELL CONSTRUCTION DIAGRAM

MONITOR-WELL NO. MW-24

PROJECT
CHEVRON CHEMICAL CO.
Belle Chase, Louisiana



NOT TO SCALE

NOTE: All Depth Measurements in Feet Below Ground Surface

LA171.02-MW-24

MW-24

Date Drilled: 3/12/83
Location: North side Landfarm A, west of Oreco Park, near MW-3
Stratigraphy:
0 to 3 ft dark gray-brown clay fill with shells
3 to 4 ft very wet sandy, clayey silt with shells
4 to 6 ft dense gray mottled brown clay
6 to 9 ft moderately dense gray clay with plant roots and woody fibres; no mottling
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 5 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2 ft. Top of PVC casing elevation is 6.65 ft above msl.

MW-25

Date Drilled: 3/12/83
Location: East end of Landfarm C, near MW-9
Stratigraphy:
0 to 3 ft dark brown clay and shell fill
3 to 7 ft gray mottled brown dense clay
7 to 14 ft soft clayey, sandy silt; wet. Last 1 ft of hole collapsed upon auger removed.
Well Construction:
Installed 5 ft of 1.25-inch PVC screen and 10 ft of 1.25-inch PVC casing. Put 6 inches coarse sand in bottom of boring, then screen and casing, then sand to 6 inches above the screen, then 2-inch bentonite seal, and cement grout to surface. Installed 4-inch steel casing protector around PVC casing. Stick-up is 2.5 ft. Top of PVC casing elevation is 12.16 ft above msl.

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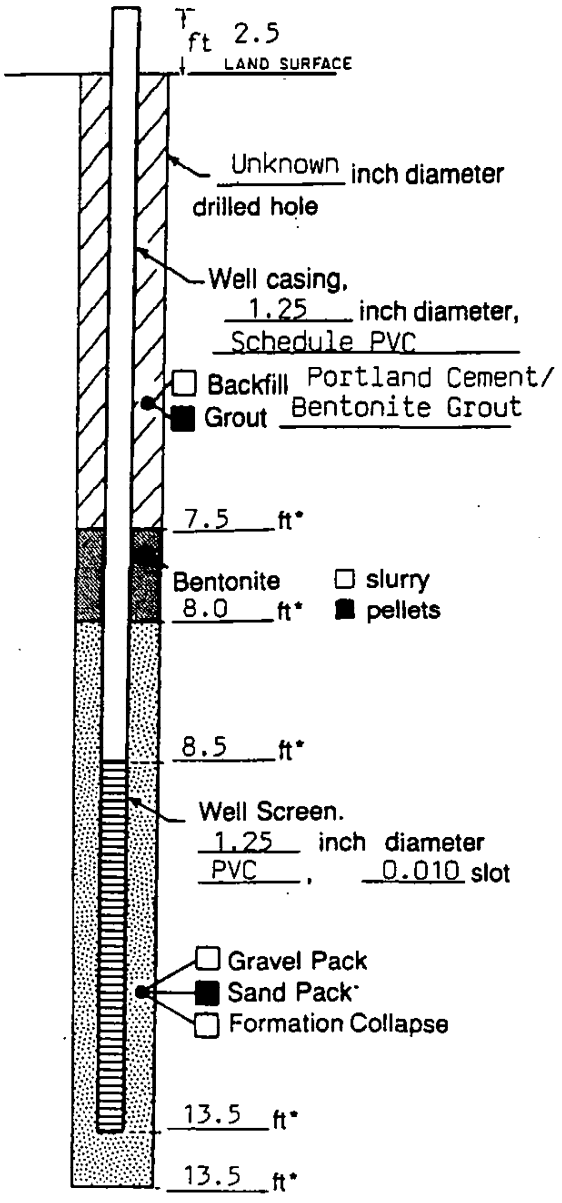
WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron Chemical Well MW-25
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum 8.55 feet (msl) ☐ Surveyed
☐ Estimated
Installation Date(s) March 12, 1983
Drilling Method (Unknown)
Drilling Contractor Ecology & Environment, Inc.
Drilling Fluid (Unknown)

Development Technique(s) and Date(s)
(Unknown)

Fluid Loss During Drilling NA gall
Water Removed During Development Unknown gall
Static Depth to Water Unknown feet below M
Pumping Depth to Water NA feet below M
Pumping Duration NA hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Hydrogeologic Investigation

Remarks
No original well construction log accompanied E&E's 1983 report. All information recorded on this document was reproduced from E&E's 1983 (May 23) report.

Prepared by Kipper W. Montgomery

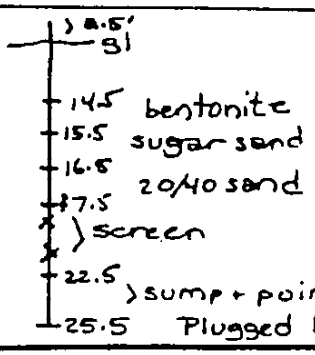
BORING LOG

PROJECT NAME Chevron PROJECT NUMBER L495BC2 PAGE 1 OF 1
LOGGED BY L. Cohen APPROX. ELEV. _____ BORING NO. MW-45
COORDINATES _____ DRILLING METHOD Mud Rotary DATE STARTED 9-25-85
GWL: DEPTH _____ ACTUAL TIME _____ DATE COMPLETED 9-25-85

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
2"ΦPVC	+2.5-17.5				
2"ΦPVC screen	17.5-22.5				
2"ΦPVC sump + point	22.5-25.5				

DEPTH	SAMPLER RECOVERY %	SAMPLE NO AND TYPE	STRATA LOG	U.S.C.S. SYMBOL	MEASURED CONSISTENCY (TSF) average (tons/ft²)	DESCRIPTION
3						FILL
6	65	S-1			0.57	CLAY, silty, micaceous, mottled brown + grey, little Fe stain, moist, some fill
9	80	S-2			0.82	CLAY, silty, micaceous, Fe-rich, black organics, med. grey w brown mottling, moist.
12	90	S-3			0.25	CLAY, silty, micaceous, grey some brown, some black organics, soft, wet.
15	95				0.10	CLAY, silty and SAND, clayey, micaceous, grey, soft, wet
20	85					15-16 AS ABOVE 16-20 SAND, micaceous, med. grain, med. grey, wet
25	80					20-23.5 SAND as above 23.5-25 SAND AND CLAY, silty & alternating layers, moist.
30	80					SAND & lenses clay and clayey sand, med grain, med grey, some shells, wet to moist

Auger
Shelby Tube

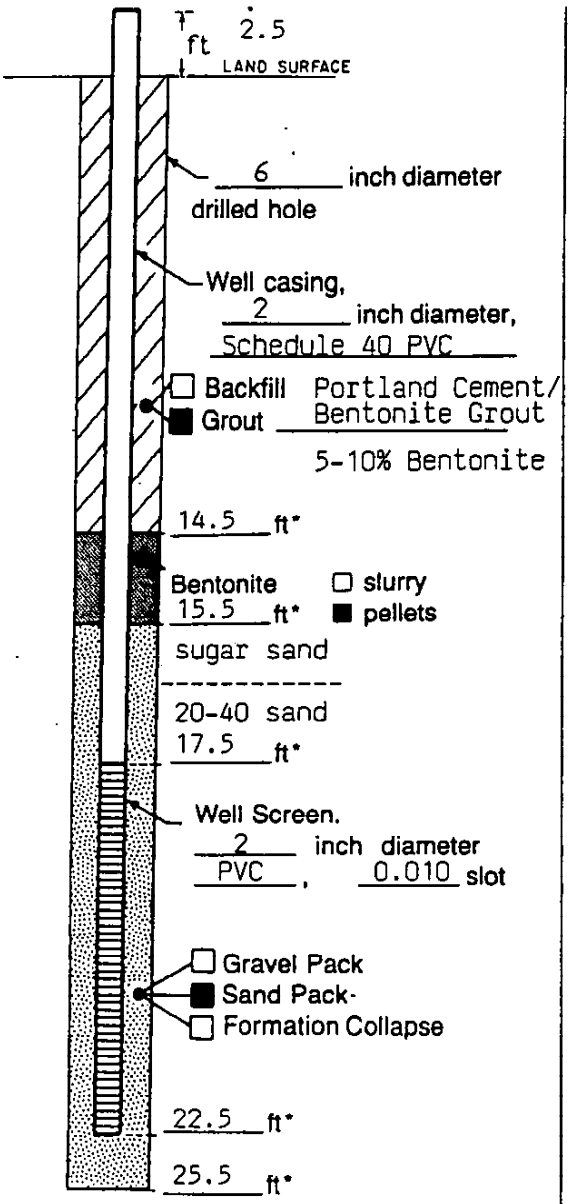


NOTE:

TRACE	0 - 5 %
LITTLE	5 - 12 %
SOME	12 - 30 %
—Y	30 - 45 %
AND	45 - 55 %

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Chevron - L0495BC2 Well MW-45
Town/City Belle Chasse
County Plaquemine State LA
Permit No. NA
Land-Surface Elevation
and Datum NA feet ☐ Surveyed
☐ Estimated
Installation Date(s) September 25, 1985
Drilling Method Mud Rotary
Drilling Contractor Eustis Engineering
Drilling Fluid Mud/Water

Development Technique(s) and Date(s)
Airlift & surge - September, 1985

Fluid Loss During Drilling Unknown gallc
Water Removed During Development Unknown gallc
Static Depth to Water Unknown feet below M
Pumping Depth to Water Unknown feet below M
Pumping Duration Unknown hours
Yield NA gpm Date NA
Specific Capacity NA gpm/ft
Well Purpose Louisiana Hazardous Waste Regulations
Compliance Monitoring Wells

Remarks
Formed filled out with information from G&M
12-30-85.

Prepared by Kipper W. Montgomery